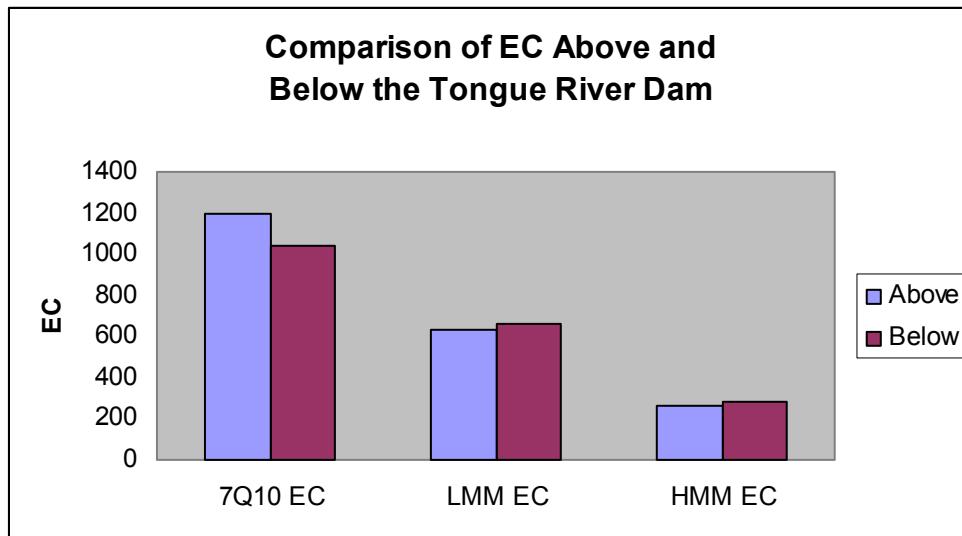
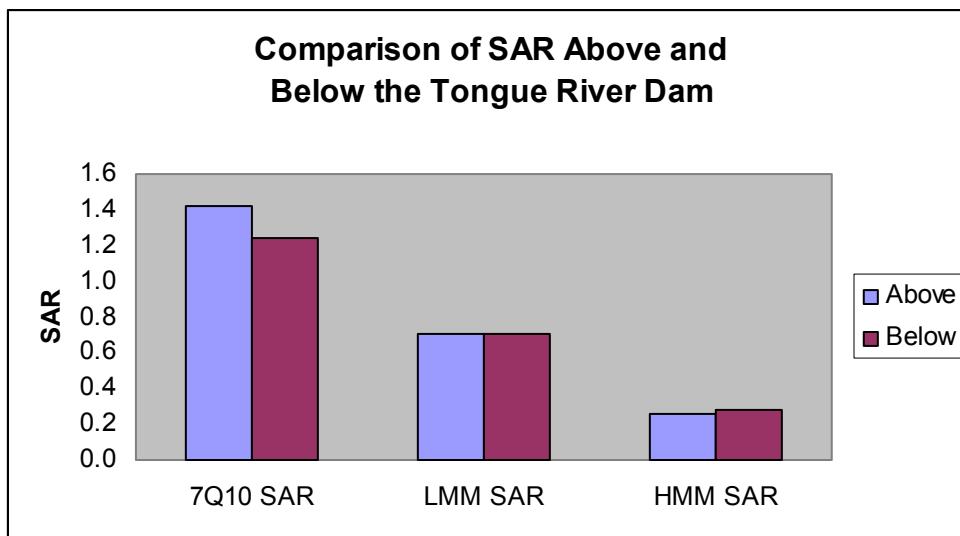


**APPENDIX C**

**Surface Water Model Narrative**

## Surface Water Model Narrative

A mass balance type surface water model was prepared for the analysis of the Badger Hills POD. This model conducts mixing in the Tongue River upstream from the Reservoir to determine the in-stream water chemistry, then considers the Tongue River Reservoir by mixing together the natural inflow from the Tongue River, the Badger Hills/CX Ranch 1,600 gpm discharge, discharges from the East and West Decker coal mines and projecting the water quality leaving the reservoir. The cumulative effects of the proposed Coal Creek CBNG POD discharges are included in this analysis by adding this discharge downstream from the dam. This model does not consider evaporation or infiltration in the reservoir. Effects of the reservoir were modeled as simple mixing, where inflows are mixed such that the outflow is less extreme than either end member. This corresponds with what is observed when comparing water quality data from above and below the dam (see comparison figures below).



Water chemistry at the stations downstream from the dam is determined by assessing the changes in the chemistry of the water released from the Dam and using this information to project the resulting chemistry of the water at these stations. This model assesses EC, Na, Ca, and Mg concentrations. SAR is calculated from the resultant ion concentrations.

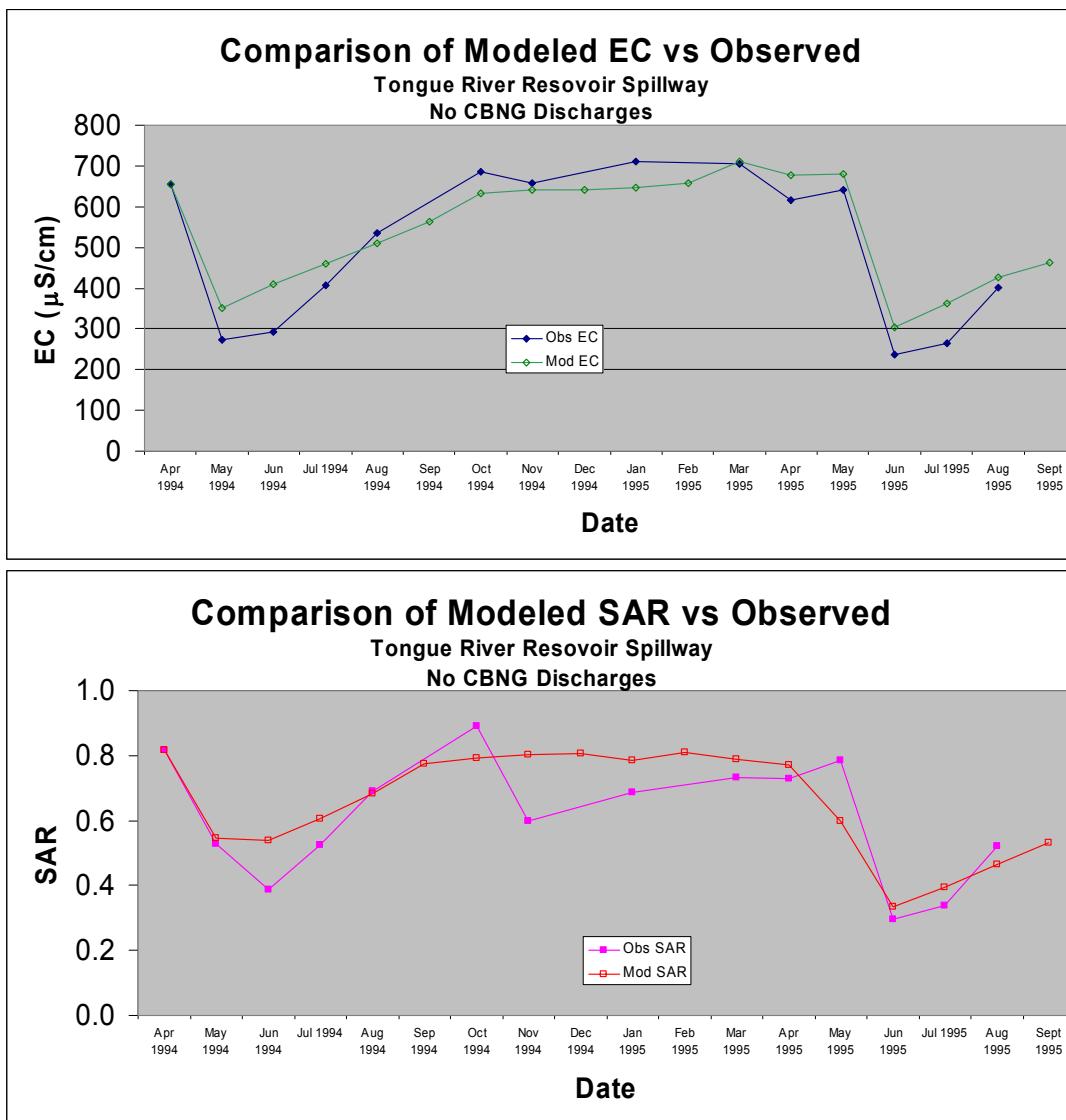
The spreadsheet model used employs a steady-state, mass-balance approach to estimate values for EC Na, Ca, and Mg after two or more inflows are mixed. This steady state approach is commonly used by states in EPA Region VIII to predict possible effects of point-source discharges on receiving waters. This approach has been endorsed in EPA guidance (EPA, 1991).

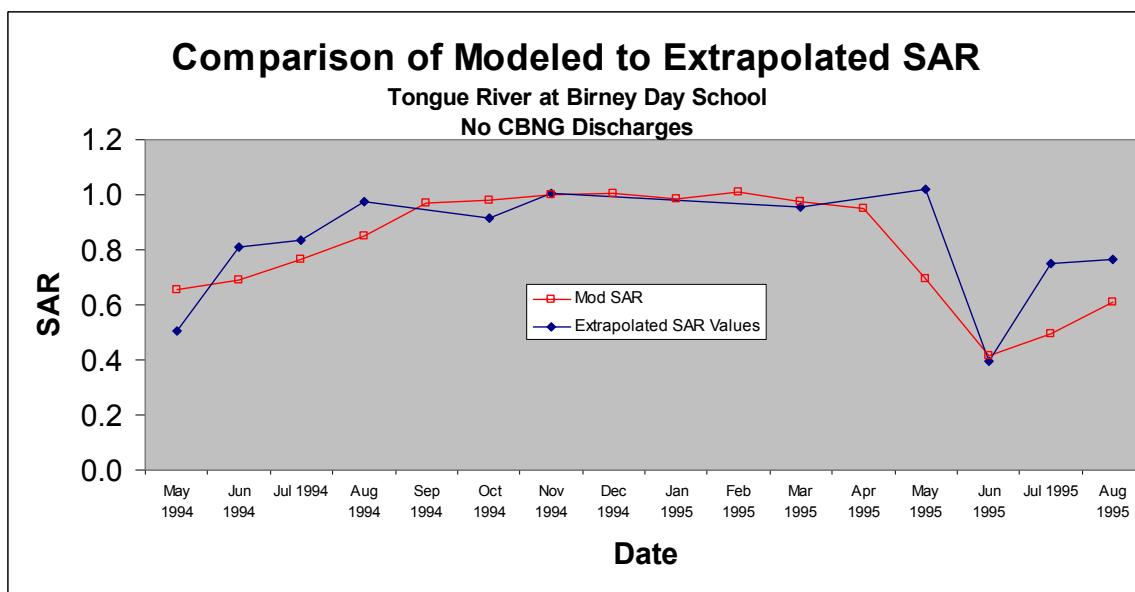
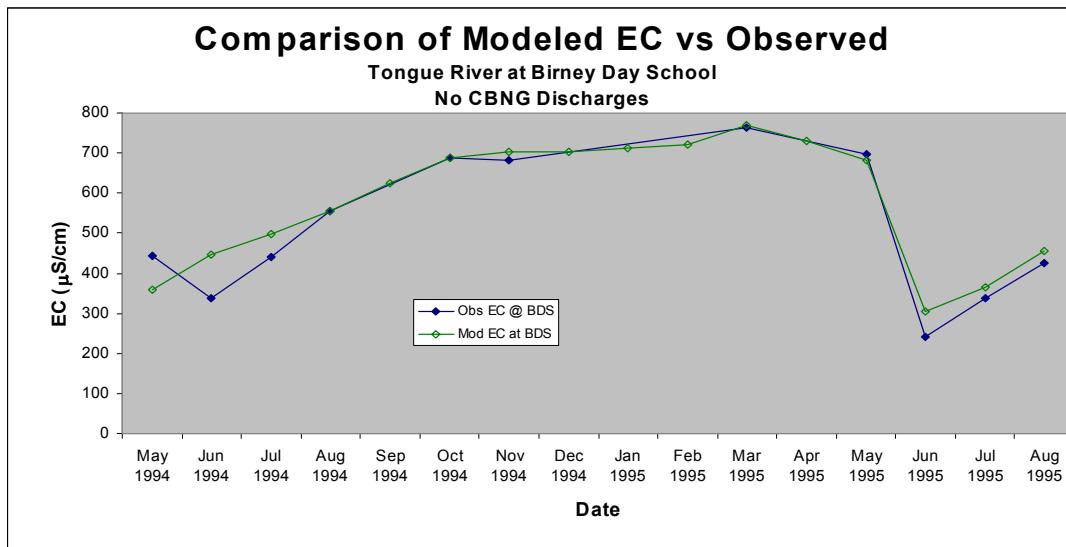
This approach does not take into account potential chemical reactions that may occur due to mixing. Equilibrium modeling of the mixed discharges was not conducted since such a model would be highly sensitive to the mineralogy of the bed and bank materials. Since the mineralogy of the materials that would come into contact with the mixed water would be quite varied due to the variations in geology, and difficult to predict on a watershed scale, such modeling was not conducted. It is felt that the simple mixing approach used is appropriate for this analysis. Actual variations in surface water chemistry will be monitored through the MPDES permitting process, and the USGS gauging stations on the Tongue River. If adverse monitoring results are observed, appropriate action will be taken to ensure that approved surface water quality standards are met.

This surface water model uses existing USGS data from the State Line, Below Dam, and Birney Day School (BDS) stations on the Tongue River, along with EPA discharge data from the East and West Decker coal mines. Water quality data for the coal mines is obtained from the coal seam monitoring well data submitted to the BLM in the Decker Coal Company Annual Hydrologic Permit Report, 2002 Water Year. The volume of water modeled to be discharged from the coal mines is the average of the maximum monthly discharges reported to the EPA (data obtained from <http://www.epa.gov/enviro/>). For the East Decker mine this rate is 1195 gpm (2.6 cfs) and for the West Decker mine this rate is 485 gpm (1.1 cfs). The water discharged from the East Decker mine is projected to have an EC of 2,621  $\mu\text{S}/\text{cm}$  and an SAR of 20.9. The discharge from the West Decker Mine is projected to have an EC of 2,129  $\mu\text{S}/\text{cm}$  and an SAR of 8.8.

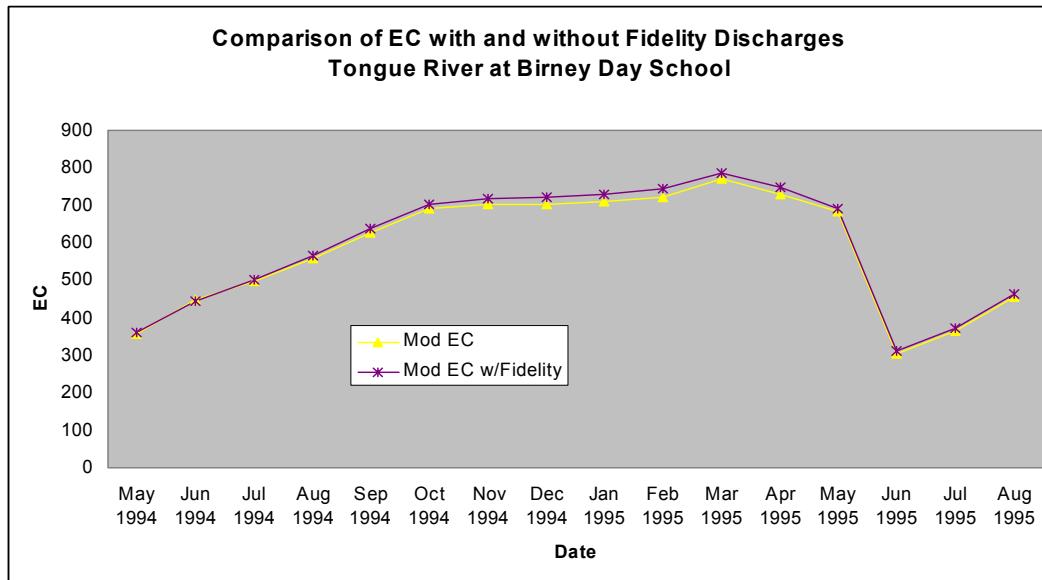
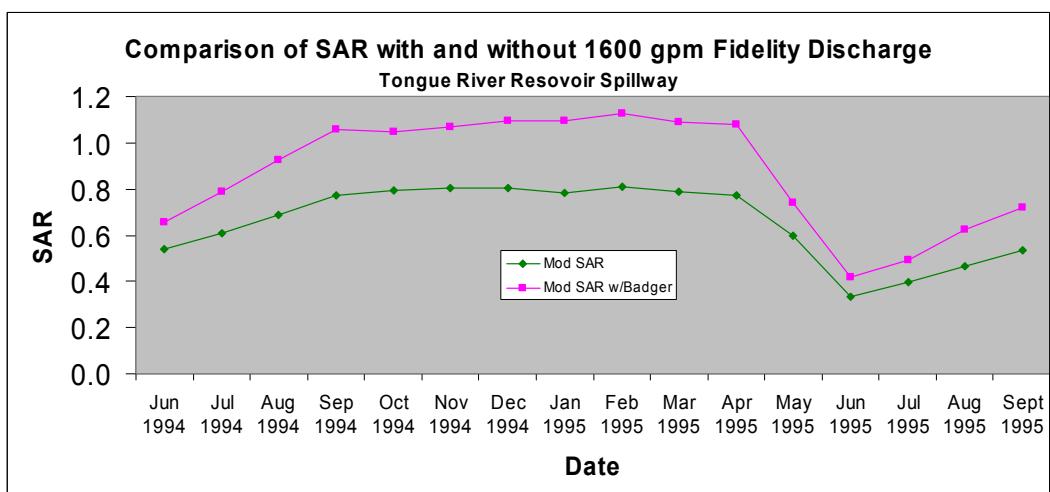
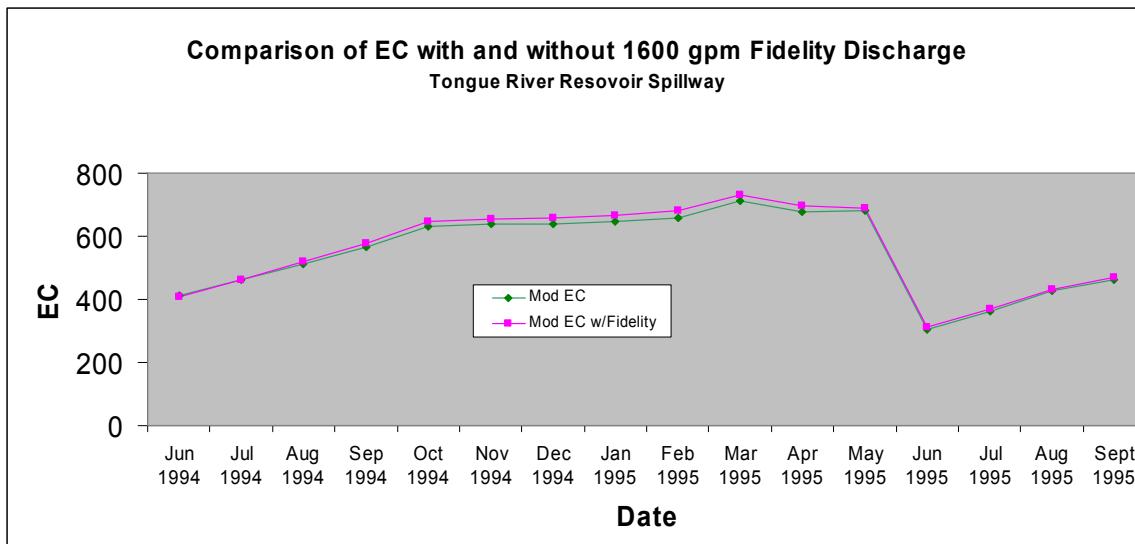
In order to calibrate the reservoir model, the time period from April 1994 to September 1995 was modeled for the Tongue River Reservoir. Inflows during this time period include the Tongue River, the East Decker Mine, and the West Decker Mine. An initial volume in the reservoir of 38,870 Ac-ft was assumed. This is the average value reported by the MT-DEQ in the Tongue River TMDL status report. Results for the station below the dam are assumed to be the same as the reservoir water chemistry (assuming complete mixing). Results for the Birney Day School (BDS) station use the relationship between the EC increase between these two stations vs. volume of flow, and adding this increase to the calculated values below the dam. A direct comparison of SAR at BDS was not

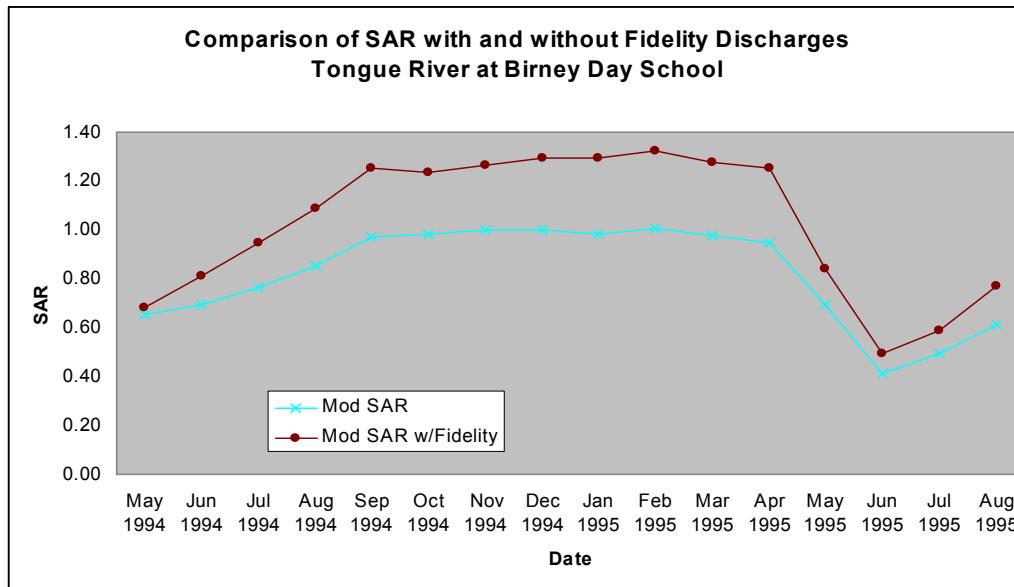
possible since SAR data was not available for this time period at that station. Instead the modeled SAR is compared to the SAR that would be extrapolated to occur based upon historical data of SAR vs. flow. Using this raw data the model was run, and the following graphs generated. It was felt that these results were acceptable and no further calibration was conducted.





Once the calibration was complete the 1600 gpm CBNG discharge from the Badger Hills/CX Field was added to the model. This discharge is predicted to have a SAR of 53.8, and an EC of 1,987 µS/cm. The addition of this discharge caused both the EC and SAR to increase across the board. The following graphs show the change that would have occurred due to this discharge over the June 1994 to September 1995 time period.





The changes seen in these values during flows similar to the high monthly mean, and low monthly mean, flows were applied to the appropriate water quality parameters. The changes at 7Q10 were determined by extrapolation of change vs. flow from the calculated values since flows were not as low at the 7Q10 flow during this time period. The results of this process are shown in the table below.

	Tongue River at State Line					
	Existing Conditions (1985-2002)*			Direct Impact of Badger Hills		
	Flow (cfs)	EC ( $\mu\text{S}/\text{cm}$ )	SAR	Flow (cfs)	EC ( $\mu\text{S}/\text{cm}$ )	SAR
7Q10	35	1193	1.42	39	1266	2.37
Low Monthly Mean	176	636	0.70	180	663	0.98
High Monthly Mean	1638	267	0.26	1642	270	0.31

	Tongue River Below Dam					
	Existing Conditions (1975-2002)*			Direct Impact of Badger Hills		
	Flow (cfs)	EC ( $\mu\text{S}/\text{cm}$ )	SAR	Flow (cfs)	EC ( $\mu\text{S}/\text{cm}$ )	SAR
7Q10	23	1043	1.24	27	1064	1.58
Low Monthly Mean	173	657	0.70	177	676	1.01
High Monthly Mean	1429	281	0.28	1433	284	0.31

	Tongue River at Birney Day School					
	Existing Conditions (1979-2002)*			Direct Impact of Badger Hills		
	Flow (cfs)	EC ( $\mu\text{S}/\text{cm}$ )	SAR	Flow (cfs)	EC ( $\mu\text{S}/\text{cm}$ )	SAR
7Q10	49	1125	1.56	53	1146	1.90
Low Monthly Mean	179	717	1.02	183	736	1.33
High Monthly	1119	379	0.56	1123	382	0.59

Mean						
------	--	--	--	--	--	--

\* These values include the effects of CBNG in Wyoming. No new discharges into the Tongue River are being permitted in Wyoming.

The 7Q10 Values for the State Line and Birney Day School Station have changed from the original EA due to updated USGS data.

The next task was to add in the cumulative impacts of the proposed Coal Creek discharge. This is a 450 gpm discharge with an EC of 493 and an SAR of 0.03. The effect of this discharge is to slightly decrease the SAR but to not noticeably affect the EC. This is due to the similarity of the EC to existing conditions and the low volume of discharge. The SAR is sufficiently low to show a slight difference. This analysis was done by taking the flow and quality data above and adding in the Coal Creek discharge to the stream at the Dam and BDS stations through simple mixing. Again the model assesses EC, Na, Ca, and Mg values. SAR values were determined from the resultant ion values. The results are summarized below.

	Tongue River at State Line								
	Existing Conditions (1985-2002)*			Direct Impact of Badger Hills			Cumulative CBNG Impacts		
	Flow (cfs)	EC ( $\mu\text{S}/\text{cm}$ )	SAR	Flow (cfs)	EC ( $\mu\text{S}/\text{cm}$ )	SAR	Flow (cfs)	EC ( $\mu\text{S}/\text{cm}$ )	SAR
7Q10	35	1193	1.42	39	1266	2.37	39	1266	2.37
Low Monthly Mean	176	636	0.70	180	663	0.98	180	663	0.98
High Monthly Mean	1638	267	0.26	1642	270	0.31	1642	270	0.31

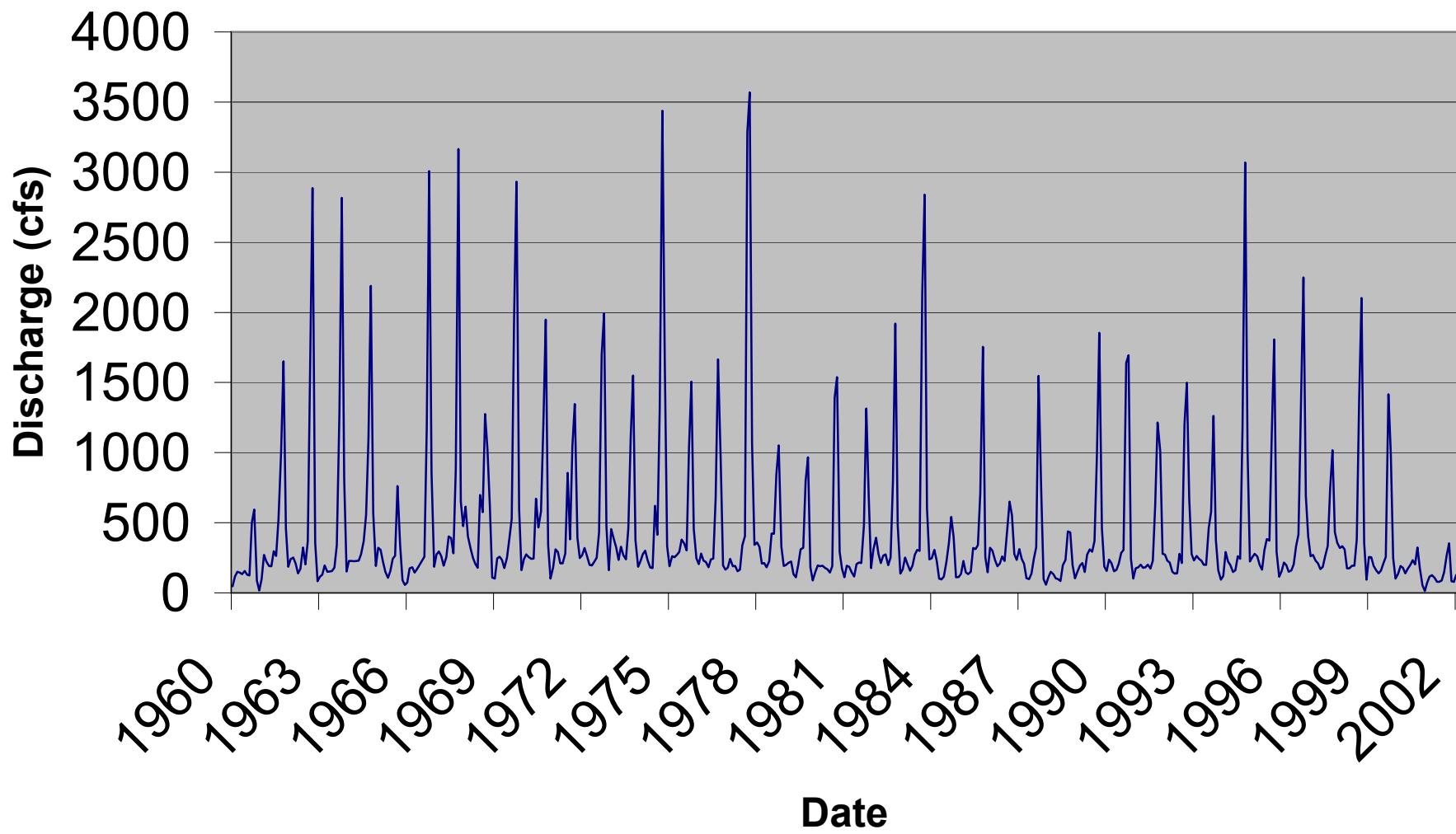
	Tongue River Below Dam								
	Existing Conditions (1975-2002)*			Direct Impact of Badger Hills			Cumulative CBNG Impacts		
	Flow (cfs)	EC ( $\mu\text{S}/\text{cm}$ )	SAR	Flow (cfs)	EC ( $\mu\text{S}/\text{cm}$ )	SAR	Flow (cfs)	EC ( $\mu\text{S}/\text{cm}$ )	SAR
7Q10	23	1043	1.24	27	1064	1.58	28	1044	1.54
Low Monthly Mean	173	657	0.70	177	676	1.01	178	675	1.00
High Monthly Mean	1429	281	0.28	1433	284	0.31	1434	284	0.31

	Tongue River at Birney Day School								
	Existing Conditions (1979-2002)*			Direct Impact of Badger Hills			Cumulative CBNG Impacts		
	Flow (cfs)	EC ( $\mu\text{S}/\text{cm}$ )	SAR	Flow (cfs)	EC ( $\mu\text{S}/\text{cm}$ )	SAR	Flow (cfs)	EC ( $\mu\text{S}/\text{cm}$ )	SAR
7Q10	49	1125	1.56	53	1146	1.90	54	1134	1.87
Low Monthly Mean	179	717	1.02	183	736	1.33	184	735	1.32
High Monthly Mean	1119	379	0.56	1123	382	0.59	1124	382	0.59

\* These values include the effects of CBNG in Wyoming. No new discharges into the Tongue River are being permitted in Wyoming.

The 7Q10 Values for the State Line and Birney Day School Station have changed from the original EA due to updated USGS data.

## Tongue River at State Line



06306300 TONGUE RIVER AT STATE LINE, NEAR DECKER, MT

LOCATION.--Lat 45°00'32", long 106°50'08" (NAD 27), in NW<sup>1</sup>/4NW<sup>1</sup>/4NE<sup>1</sup>/4 sec.33, T.9 S., R.40 E., Big Horn County, Hydrologic Unit 10090101, on left bank 1 mi north of Wyoming-Montana State line, 1.4 mi southeast of Decker, 1.6 mi upstream from Badger Creek, and at river mile 200.9.

DRAINAGE AREA.--1,477 mi<sup>2</sup>.

PERIOD OF RECORD.--August 1960 to current year. Records published as "near Decker" May 1928 to September 1938, not equivalent owing to intervening drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 3,429.14 ft (NGVD 29) (levels by U.S. Army Corps of Engineers).

REMARKS.--Water-discharge records good except those for estimated daily discharges, which are poor. Flow regulated by many small reservoirs in Wyoming, combined capacity, about 15,000 acre-ft. Diversions for irrigation of about 64,300 acres upstream from station. U.S. Geological Survey satellite telemeter at station.

MAGNITUDE AND PROBABILITY OF ANNUAL LOW FLOW BASED ON 41 YEARS OF RECORD 1961-2002						
Discharge, in ft <sup>3</sup> /s, for indicated recurrence interval, in years, and non-exceedance probability, in percent						
	2	5	10	20	50	100
(Period of consecutive days)	50%	20%	10%	5%	2%	1%
1	88	50	30	18	9.0	—
3	94	53	33	20	10	—
7	102	57	36	21	11	—
14	113	63	40	25	13	—
30	127	74	48	31	18	—
60	147	91	64	46	29	—
90	164	115	91	73	55	—
120	184	139	116	98	79	—
183	197	153	131	115	97	—

MAGNITUDE AND PROBABILITY OF ANNUAL HIGH FLOW BASED ON 42 YEARS OF RECORD 1960-2002						
Discharge, in ft <sup>3</sup> /s, for indicated recurrence interval, in years, and non-exceedance probability, in percent						
	2	5	10	25	50	100
(Period of consecutive days)	50%	20%	10%	5%	2%	1%
1	2,820	4,880	5,880	7,570	8,750	—
3	2,610	4,140	5,090	6,190	6,940	—
7	2,350	3,600	4,310	5,070	5,580	—
15	2,100	3,170	3,750	4,350	4,710	—
30	1,830	2,780	3,290	3,810	4,120	—
60	1,370	2,070	2,450	2,860	3,110	—
90	1,080	1,580	1,860	2,150	2,330	—

MAGNITUDE AND PROBABILITY OF SEASONAL LOW FLOW FROM MARCH-JUNE BASED ON 42 SEASONS OF RECORD 1960-2002						
Discharge, in ft <sup>3</sup> /s, for indicated recurrence interval, in years, and non-exceedance probability, in percent						
	2	5	10	20	50	100
(Period of consecutive days)	50%	20%	10%	5%	2%	1%
1	165	118	97	82	67	—
3	174	126	105	88	72	—
7	187	139	118	102	86	—
14	213	163	140	122	104	—
30	247	183	154	133	112	—

MAGNITUDE AND PROBABILITY OF SEASONAL LOW FLOW FROM JULY-OCTOBER BASED ON 42 SEASONS OF RECORD 1960-2002						
Discharge, in ft <sup>3</sup> /s, for indicated recurrence interval, in years, and non-exceedance probability, in percent						
	2	5	10	20	50	100
(Period of consecutive days)	50%	20%	10%	5%	2%	1%
1	116	57	32	19	9.4	—
3	118	58	34	21	11	—
7	124	61	36	22	12	—
14	132	67	41	26	14	—
30	148	78	49	32	18	—

MAGNITUDE AND PROBABILITY OF SEASONAL LOW FLOW FROM NOVEMBER-FEBRUARY BASED ON 42 SEASONS OF RECORD 1960-2002						
Discharge, in ft <sup>3</sup> /s, for indicated recurrence interval, in years, and non-exceedance probability, in percent						
	2	5	10	20	50	100
(Period of consecutive days)	50%	20%	10%	5%	2%	1%
1	93	69	58	51	42	—
3	102	77	65	57	48	—
7	117	89	76	66	56	—
14	135	103	87	75	63	—
30	154	118	100	86	71	—

MONTHLY AND ANNUAL MEAN DISCHARGES 1960-2002						
Month	Maximum (ft <sup>3</sup> /s)	Minimum (ft <sup>3</sup> /s)	Mean (ft <sup>3</sup> /s)	Standard deviation (ft <sup>3</sup> /s)	Years of record	
October	402	116	253	67	42	
November	324	126	224	47	42	
December	271	102	179	44	42	
January	330	79	177	54	42	
February	672	60	229	101	42	
March	855	89	303	148	42	
April	676	124	355	129	42	
May	3,280	268	1,140	549	42	
June	3,570	176	1,840	945	42	
July	1,670	55	461	329	42	
August	475	13	176	102	42	
September	615	47	214	107	43	
Annual	862	138	446	156	42	

Provisional USGS data obtained  
from Helena USGS office.

	<b>Data Category:</b>	<b>Geographic Area:</b>
Water Resources	Surface Water	Montana
		go

# Monthly Streamflow Statistics for Montana

USGS 06306300 Tongue River at State Line nr Decker MT

Available data for this site

Surface-water: Monthly streamflow statistics

GO

Big Horn County, Montana  
 Hydrologic Unit Code 10090101  
 Latitude 45°00'32", Longitude 106°50'08" NAD27  
 Drainage area 1,477.00 square miles  
 Gage datum 3,430 feet above sea level NGVD29

## Output formats

- HTML table of all data
- Tab-separated data
- Reselect output format

YEAR	Monthly mean streamflow, in ft <sup>3</sup> /s												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1960										46.7	116	150	145
1961	133	157	129	124	500	594	87.5	16.5	98.3	270	223	191	
1962	190	298	263	525	1,009	1,651	460	187	241	252	208	140	
1963	171	324	204	366	1,620	2,886	362	83.5	115	130	195	150	
1964	153	157	181	341	1,291	2,817	814	152	228	227	225	227	
1965	230	276	368	556	1,099	2,189	570	192	322	306	221	151	
1966	108	156	242	265	762	342	90.2	55.9	74.2	174	182	145	
1967	169	198	230	258	1,184	3,007	860	186	274	295	261	193	
1968	254	402	391	283	884	3,165	651	475	615	403	317	250	
1969	207	179	698	576	1,275	1,024	624	110	102	247	258	235	
1970	176	250	386	528	1,964	2,931	599	161	239	275	256	242	
1971	245	672	466	582	1,205	1,949	340	101	182	310	291	211	
1972	210	280	855	382	1,048	1,346	393	249	269	320	266	199	
1973	195	221	250	431	1,699	1,991	474	162	455	383	324	236	
1974	330	269	239	461	1,108	1,550	376	187	225	277	301	234	
1975	180	177	621	413	1,308	3,437	1,674	334	189	262	254	271	
1976	291	379	352	303	1,042	1,506	455	246	205	280	230	220	
1977	182	239	244	676	1,664	955	195	166	180	242	189	192	
1978	154	165	339	404	3,283	3,570	1,067	342	360	328	208	213	
1979	183	225	424	422	842	1,051	331	191	200	214	224	134	

<b>1980</b>	111	200	310	321	799	966	182	88.7	151	195	190	193
<b>1981</b>	178	168	145	190	1,392	1,538	291	171	111	194	187	145
<b>1982</b>	116	205	216	212	481	1,315	698	177	311	393	279	212
<b>1983</b>	265	274	197	252	798	1,920	487	138	168	252	205	158
<b>1984</b>	193	272	306	299	2,133	2,839	603	238	246	306	228	102
<b>1985</b>	95.9	117	226	355	541	397	111	112	136	228	147	134
<b>1986</b>	150	320	312	340	711	1,755	256	147	321	301	233	189
<b>1987</b>	208	259	227	448	651	554	277	235	312	242	207	105
<b>1988</b>	98.1	138	243	325	1,548	726	97.0	58.3	111	150	133	104
<b>1989</b>	98.5	84.5	197	236	439	431	195	104	155	196	212	149
<b>1990</b>	272	310	294	371	974	1,855	461	188	156	237	213	154
<b>1991</b>	163	209	284	307	1,639	1,695	242	102	174	183	201	178
<b>1992</b>	182	201	173	229	626	1,214	1,012	279	272	229	217	150
<b>1993</b>	137	139	278	212	1,200	1,499	672	276	231	264	242	229
<b>1994</b>	201	199	464	580	1,261	377	162	93.6	121	292	224	198
<b>1995</b>	148	161	261	243	1,180	3,069	1,022	223	254	278	260	199
<b>1996</b>	166	304	384	373	1,147	1,807	294	114	155	217	198	151
<b>1997</b>	160	204	333	415	1,290	2,250	691	400	262	270	230	211
<b>1998</b>	170	185	260	335	739	1,018	433	358	320	333	311	174
<b>1999</b>	175	193	193	382	1,373	2,102	357	94.8	256	254	192	160
<b>2000</b>	140	159	211	256	1,416	995	247	101	137	192	179	140
<b>2001</b>	172	199	233	203	323	176	54.7	13.1	73.3	117	126	107
<b>2002</b>	78.7	79.8	88.5	147	268	354	83.3	78.1	128			
<b>Mean of monthly streamflows</b>	177	229	303	355	1,136	1,638	461	176	214	253	224	179

Questions about data [gs-w-mt\\_NWISWeb\\_Data\\_Inquiries@usgs.gov](mailto:gs-w-mt_NWISWeb_Data_Inquiries@usgs.gov)

Feedback on this website [gs-w-mt\\_NWISWeb\\_Maintainer@usgs.gov](mailto:gs-w-mt_NWISWeb_Maintainer@usgs.gov)

Surface Water data for Montana: Monthly Streamflow Statistics

[http://waterdata.usgs.gov/mt/nwis/monthly?](http://waterdata.usgs.gov/mt/nwis/monthly?site_no=06306300)

Top

Explanation of terms

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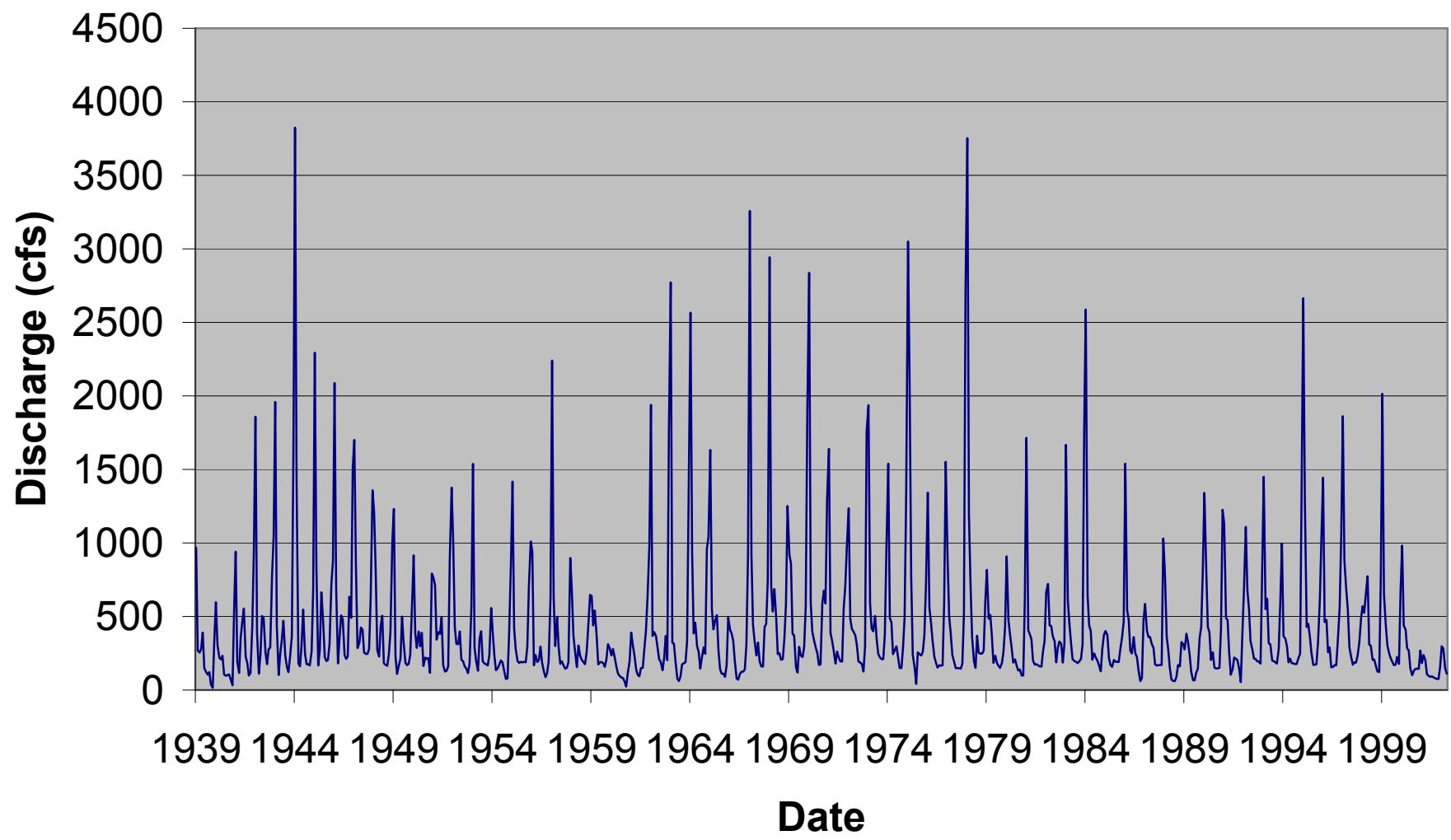
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## Tongue River Below Dam



06307500 TONGUE RIVER AT TONGUE RIVER DAM, NEAR DECKER, MT

LOCATION.--Lat 45°08'29", long 106°46'15" (NAD 27), in SW<sup>1/4</sup>SE<sup>1/4</sup>SE<sup>1/4</sup> sec.12, T.8 S., R.40 E., Big Horn County, Hydrologic Unit 10090101, on left bank 0.5 mi downstream from Tongue River Dam, 4 mi upstream from Post Creek, 8 mi northeast of Decker, 16 mi southeast of Kirby, and at river mile 188.4.

DRAINAGE AREA.--1,770 mi<sup>2</sup>.

PERIOD OF RECORD.--May 1939 to current year.

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 3,344.40 ft (NGVD 29) (levels by Bureau of Reclamation). Prior to Aug. 5, 1975, at datum 10.00 ft lower.

REMARKS.--Records good. Flow regulated by Tongue River Reservoir (station number 06307000) and many small reservoirs, combined capacity, about 15,000 acre-ft. Diversion for irrigation of about 64,800 acres upstream from station. U.S. Geological Survey satellite telemeter at station.

MAGNITUDE AND PROBABILITY OF ANNUAL LOW FLOW BASED ON 63 YEARS OF RECORD 1939-2002						
Discharge, in ft <sup>3</sup> /s, for indicated recurrence interval, in years, and non-exceedance probability, in percent						
(Period of consecutive days)	2	5	10	20	50	100
1	67	25	12	5.8	2.2	1.1
3	82	33	16	7.4	2.6	1.2
7	104	48	27	10	3.4	1.4
14	127	74	45	15	4.3	2.6
30	128	75	49	32	19	12
60	150	99	73	53	36	26
90	171	126	105	66	68	56
120	184	143	117	97	77	65
183	232	174	145	123	100	87

MAGNITUDE AND PROBABILITY OF ANNUAL HIGH FLOW BASED ON 63 YEARS OF RECORD 1939-2002						
Discharge, in ft <sup>3</sup> /s, for indicated recurrence interval, in years, and non-exceedance probability, in percent						
(Period of consecutive days)	2	5	10	20	50	100
1	2,210	3,680	4,550	5,530	6,160	6,720
3	2,130	3,440	4,190	4,980	5,460	5,970
7	1,990	3,170	3,840	4,540	4,960	5,320
15	1,770	2,810	3,410	4,060	4,470	4,820
30	1,480	2,380	2,930	3,570	4,000	4,380
60	1,130	1,790	2,200	2,700	3,040	3,360
90	936	1,410	1,710	2,060	2,300	2,530

MAGNITUDE AND PROBABILITY OF SEASONAL LOW FLOW FROM MARCH-JUNE BASED ON 63 SEASONS OF RECORD 1939-2002						
Discharge, in ft <sup>3</sup> /s, for indicated recurrence interval, in years, and non-exceedance probability, in percent						
(Period of consecutive days)	2	5	10	20	50	100
1	118	42	19	8.1	2.7	1.1
3	136	53	23	10	3.2	1.3
7	169	75	34	15	4.4	1.7
14	185	82	47	16	4.7	2.8
30	198	100	61	38	21	13

MAGNITUDE AND PROBABILITY OF SEASONAL LOW FLOW FROM JULY-OCTOBER BASED ON 63 SEASONS OF RECORD 1939-2002						
Discharge, in ft <sup>3</sup> /s, for indicated recurrence interval, in years, and non-exceedance probability, in percent						
(Period of consecutive days)	2	5	10	20	50	100
1	108	63	46	36	27	22
3	118	71	54	43	33	28
7	132	85	68	57	47	42
14	158	101	80	67	54	47
30	196	132	106	86	71	61

MAGNITUDE AND PROBABILITY OF SEASONAL LOW FLOW FROM NOVEMBER-FEBRUARY BASED ON 63 SEASONS OF RECORD 1939-2002						
Discharge, in ft <sup>3</sup> /s, for indicated recurrence interval, in years, and non-exceedance probability, in percent						
(Period of consecutive days)	2	5	10	20	50	100
1	114	58	36	23	12	7.7
3	128	73	47	30	17	11
7	140	86	56	36	20	13
14	141	92	69	53	37	29
30	146	103	82	66	50	41

MONTHLY AND ANNUAL MEAN DISCHARGES, 1939-2002						
Month	Maximum (ft <sup>3</sup> /s)	Minimum (ft <sup>3</sup> /s)	Mean (ft <sup>3</sup> /s)	Standard deviation (ft <sup>3</sup> /s)	Years of record	
October	665	71	274	127	63	
November	554	41	254	133	63	
December	369	62	188	57	63	
January	287	80	173	42	63	
February	592	57	180	74	63	
March	676	23	224	128	63	
April	958	15	362	217	63	
May	2,710	157	903	493	63	
June	3,820	183	1,430	892	64	
July	2,080	169	571	327	64	
August	768	103	361	156	64	
September	775	107	308	132	64	
Annual	853	133	437	152	63	

Provisional USGS data obtained  
from Helena USGS office.

	<b>Data Category:</b>	<b>Geographic Area:</b>
Water Resources	Surface Water	Montana
		go

# Monthly Streamflow Statistics for Montana

USGS 06307500 Tongue River at Tongue R Dam nr Decker MT

Available data for this site

Surface-water: Monthly streamflow statistics

GO

Big Horn County, Montana  
 Hydrologic Unit Code 10090101  
 Latitude 45°08'29", Longitude 106°46'15" NAD27  
 Drainage area 1,770.00 square miles  
 Gage datum 3,344.4 feet above sea level NGVD29

## Output formats

- HTML table of all data
- Tab-separated data
- Reselect output format

YEAR	Monthly mean streamflow, in ft <sup>3</sup> /s											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1939						967	269	255	277	391	149	121
1940	104	122	38.2	14.9	344	597	306	221	208	233	105	97.4
1941	102	106	73.0	32.1	540	940	194	117	354	465	554	225
1942	184	98.0	115	432	949	1,859	391	111	244	503	490	256
1943	176	278	288	782	1,045	1,958	436	103	247	338	471	235
1944	160	121	221	363	1,637	3,824	1,406	180	162	310	546	246
1945	175	176	166	261	692	2,294	850	166	271	665	487	224
1946	198	204	313	722	879	2,087	695	181	357	508	482	239
1947	211	228	634	491	1,513	1,701	848	285	321	425	413	254
1948	245	245	280	627	1,359	1,207	811	271	227	438	506	181
1949	171	165	242	396	1,006	1,231	229	109	168	213	500	320
1950	183	170	178	238	586	916	387	286	398	298	389	163
1951	221	212	216	116	792	764	714	342	395	382	495	168
1952	126	130	162	883	1,376	1,006	431	314	312	398	206	197
1953	159	145	114	175	569	1,538	286	197	130	350	399	196
1954	180	176	167	237	558	390	237	134	148	174	200	189
1955	123	76.0	79.6	383	864	1,417	421	280	198	184	192	189
1956	191	188	291	702	1,010	940	169	239	190	205	295	186
1957	125	88.6	114	195	628	2,241	633	300	498	288	177	195
1958	164	145	151	189	898	670	368	264	156	302	237	206

<b>1959</b>	190	176	256	426	647	639	439	541	369	174	190	190
<b>1960</b>	182	158	208	311	283	235	279	226	158	111	96.3	86.5
<b>1961</b>	79.9	56.9	22.7	115	195	390	307	240	138	103	93.9	149
<b>1962</b>	150	279	403	631	986	1,939	367	395	367	290	209	191
<b>1963</b>	134	217	367	203	1,764	2,773	323	316	197	77.1	60.4	90.8
<b>1964</b>	174	183	188	332	1,329	2,567	946	386	458	298	258	146
<b>1965</b>	219	291	245	958	1,040	1,633	551	412	469	509	270	144
<b>1966</b>	111	111	89.4	171	493	410	383	336	198	78.9	69.8	108
<b>1967</b>	124	125	140	308	905	3,258	924	444	334	234	322	197
<b>1968</b>	162	159	429	450	746	2,942	707	534	687	493	244	251
<b>1969</b>	206	209	347	583	1,250	922	860	384	371	154	118	294
<b>1970</b>	236	224	293	568	1,891	2,837	592	396	343	288	251	170
<b>1971</b>	173	592	676	588	1,303	1,639	387	335	269	179	262	223
<b>1972</b>	195	194	558	706	978	1,236	484	415	398	371	306	194
<b>1973</b>	189	176	125	295	1,761	1,937	588	418	399	503	347	246
<b>1974</b>	223	209	209	374	961	1,539	490	460	244	272	297	226
<b>1975</b>	150	149	288	493	1,340	3,051	2,083	767	239	153	40.6	256
<b>1976</b>	244	235	259	372	719	1,343	561	460	337	224	185	153
<b>1977</b>	168	164	169	593	1,552	891	499	383	238	190	149	149
<b>1978</b>	149	146	179	518	2,713	3,752	1,188	723	359	198	151	369
<b>1979</b>	252	247	248	269	599	818	483	511	365	185	233	185
<b>1980</b>	164	150	182	260	431	908	474	375	287	186	208	165
<b>1981</b>	132	140	98.3	99.3	618	1,715	407	379	346	199	172	175
<b>1982</b>	169	162	160	263	335	667	722	439	436	365	331	189
<b>1983</b>	287	330	314	187	313	1,666	607	451	323	209	197	191
<b>1984</b>	183	193	211	310	1,768	2,587	644	439	402	206	249	221
<b>1985</b>	200	168	128	285	374	401	375	216	169	157	205	192
<b>1986</b>	191	190	288	362	466	1,540	543	476	267	250	360	249
<b>1987</b>	226	136	61.4	79.8	470	586	404	360	360	316	287	174
<b>1988</b>	166	169	171	171	1,031	807	362	273	147	71.1	60.2	61.7
<b>1989</b>	88.9	170	162	327	313	276	381	325	240	124	66.3	66.0
<b>1990</b>	118	143	355	430	818	1,341	815	430	393	204	256	152
<b>1991</b>	147	147	150	421	1,225	1,133	491	475	252	104	141	220
<b>1992</b>	213	204	143	54.4	376	682	1,110	678	555	332	276	213
<b>1993</b>	211	196	193	179	802	1,449	550	621	317	312	201	196
<b>1994</b>	190	179	282	605	996	366	349	299	189	213	183	181
<b>1995</b>	175	178	214	247	1,424	2,664	1,285	428	449	363	252	171
<b>1996</b>	172	175	328	622	1,046	1,444	463	476	257	291	154	157

<b>1997</b>	168	169	335	559	1,051	1,862	882	683	544	291	230	172
<b>1998</b>	188	187	233	331	485	569	525	666	775	308	303	205
<b>1999</b>	208	166	128	122	764	2,015	651	441	303	255	219	190
<b>2000</b>	169	172	224	178	673	982	437	413	281	271	149	101
<b>2001</b>	129	143	146	144	268	183	239	202	107	97.1	90.1	92.7
<b>2002</b>	86.8	80.3	75.4	75.5	157	297	284	148	112			
<b>Mean of monthly streamflows</b>	LMM 173		180	224	362	903 1,429	FMM 571	361	308	274	255	188

Questions about data [gs-w-mt\\_NWISWeb\\_Data\\_Inquiries@usgs.gov](mailto:gs-w-mt_NWISWeb_Data_Inquiries@usgs.gov)

Feedback on this website [gs-w-mt\\_NWISWeb\\_Maintainer@usgs.gov](mailto:gs-w-mt_NWISWeb_Maintainer@usgs.gov)

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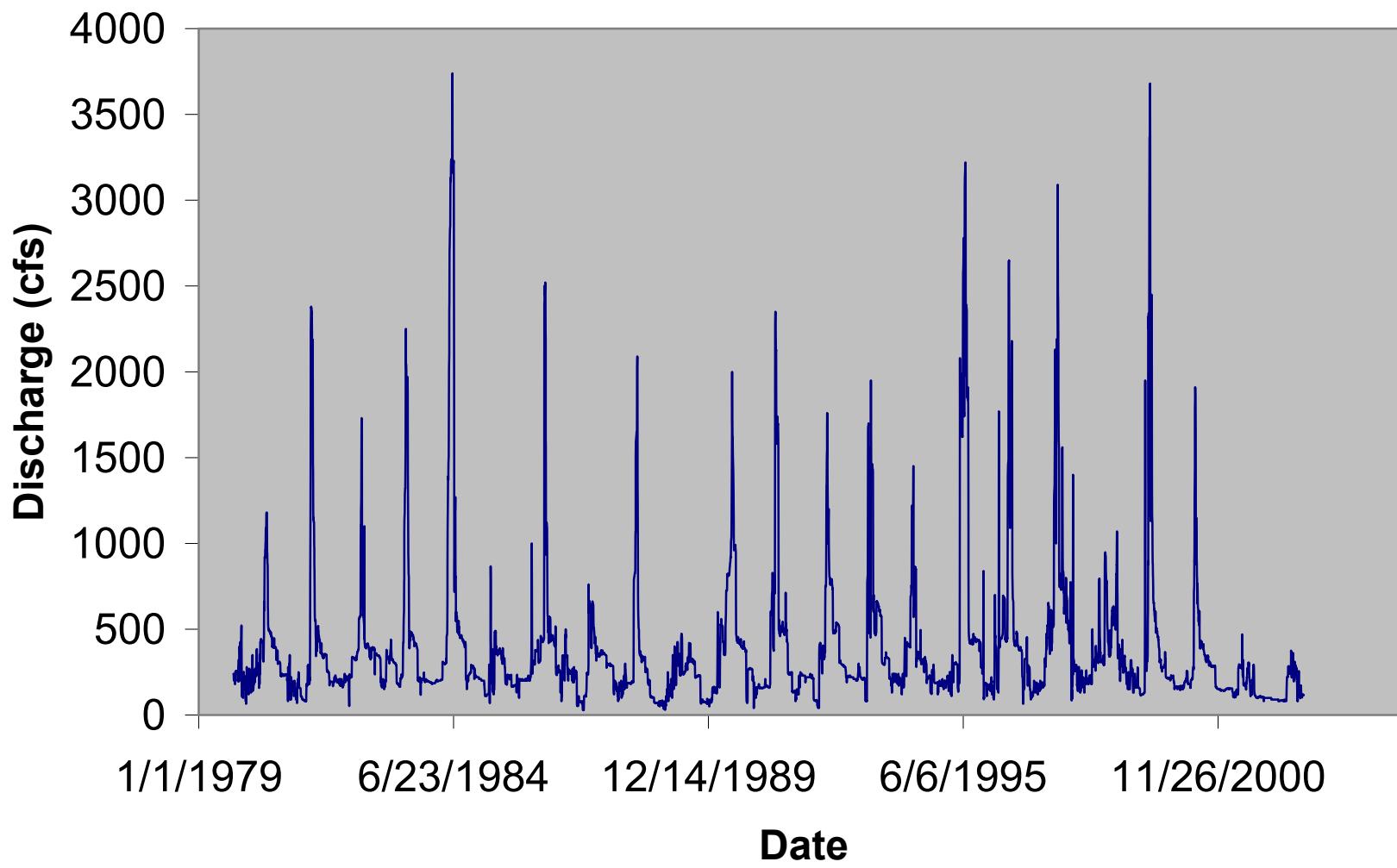
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## Tongue River at Birney Day School



06307616 TONGUE RIVER AT BIRNEY DAY SCHOOL BRIDGE, NEAR BIRNEY, MT

LOCATION.--Lat 45°24'42", long 106°27'26" (NAD 27), in SE<sup>1/4</sup>SW<sup>1/4</sup>SW<sup>1/4</sup> sec.8, T.5 S., R.43 E., Rosebud County, Hydrologic Unit 10090102, on left bank, 60 ft upstream from Bureau of Indian Affairs bridge, 0.2 mi east of Birney Day School, 5.5 mi downstream from Cook Creek, 6.5 mi northeast of Birney, and at river mile 144.3.

DRAINAGE AREA.--2,621 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1979 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 3,060 ft (NGVD 29).

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow regulated by Tongue River Reservoir (station number 06307000), and many small reservoirs in Wyoming (combined capacity, about 15,000 acre-ft). Numerous diversions for irrigation upstream from station.

MAGNITUDE AND PROBABILITY OF ANNUAL LOW FLOW BASED ON 22 YEARS OF RECORD, 1981-2002						
(Period of consecutive days)	Discharge, in ft <sup>3</sup> /s, for indicated recurrence interval, in years, and non-exceedance probability, in percent					
	2	5	10	20	50	100
1	74	49	39	31	—	—
3	85	56	44	35	—	—
7	96	64	52	38	—	—
14	108	74	59	48	—	—
30	130	92	74	61	—	—
60	149	108	88	73	—	—
90	179	131	105	84	—	—
120	194	143	116	94	—	—
183	230	172	142	119	—	—

MAGNITUDE AND PROBABILITY OF ANNUAL HIGH FLOW BASED ON 23 YEARS OF RECORD, 1980 - 2002						
(Period of consecutive days)	Discharge, in ft <sup>3</sup> /s, for indicated recurrence interval, in years, and non-exceedance probability, in percent					
	2	5	10	20	50	100
1	1,810	2,850	3,430	4,030	—	—
3	1,700	2,750	3,340	3,950	—	—
7	1,590	2,600	3,180	3,790	—	—
15	1,410	2,320	2,830	3,380	—	—
30	1,170	1,940	2,430	3,000	—	—
60	889	1,420	1,760	2,180	—	—
90	747	1,140	1,380	1,680	—	—

MAGNITUDE AND PROBABILITY OF SEASONAL LOW FLOW FROM MARCH-JUNE BASED ON 23 SEASONS OF RECORD, 1980-2002						
(Period of consecutive days)	Discharge, in ft <sup>3</sup> /s, for indicated recurrence interval, in years, and non-exceedance probability, in percent					
	2	5	10	20	50	100
1	123	74	54	41	—	—
3	132	80	58	43	—	—
7	144	88	63	46	—	—
14	159	95	71	54	—	—
30	183	113	86	66	—	—

MAGNITUDE AND PROBABILITY OF SEASONAL LOW FLOW FROM JULY-OCTOBER BASED ON 22 SEASONS OF RECORD, 1980-2002						
(Period of consecutive days)	Discharge, in ft <sup>3</sup> /s, for indicated recurrence interval, in years, and non-exceedance probability, in percent					
	2	5	10	20	50	100
1	142	89	69	56	—	—
3	157	97	75	60	—	—
7	172	110	85	68	—	—
14	196	129	100	80	—	—
30	233	161	128	104	—	—

MAGNITUDE AND PROBABILITY OF SEASONAL LOW FLOW FROM NOVEMBER-FEBRUARY BASED ON 22 SEASONS OF RECORD, 1980-2002						
(Period of consecutive days)	Discharge, in ft <sup>3</sup> /s, for indicated recurrence interval, in years, and non-exceedance probability, in percent					
	2	5	10	20	50	100
1	101	65	50	39	—	—
3	112	77	61	49	—	—
7	125	88	70	57	—	—
14	141	101	81	66	—	—
30	161	120	97	78	—	—

MONTHLY AND ANNUAL MEAN DISCHARGES, 1980-2002					
Month	Maximum (ft <sup>3</sup> /s)	Minimum (ft <sup>3</sup> /s)	Mean (ft <sup>3</sup> /s)	Standard deviation (ft <sup>3</sup> /s)	Years of record
October	381	85	246	83	23
November	347	66	219	77	23
December	260	64	179	49	23
January	267	91	179	45	23
February	350	90	197	60	23
March	434	78	226	94	23
April	583	66	275	157	23
May	1,770	144	654	397	23
June	2,920	225	1,120	745	23
July	1,270	234	556	257	23
August	676	159	399	136	23
September	694	113	320	137	23
Annual	644	133	381	127	23

Provisional USGS data obtained from Helena USGS office.

	<b>Data Category:</b>	<b>Geographic Area:</b>
Water Resources	Surface Water	Montana
		go

# Monthly Streamflow Statistics for Montana

USGS 06307616 Tongue R at Birney Day School Br nr Birney MT

Available data for this site

Surface-water: Monthly streamflow statistics

GO

Rosebud County, Montana  
 Hydrologic Unit Code 10090102  
 Latitude 45°24'42", Longitude 106°27'26" NAD27  
 Drainage area 2,621.00 square miles  
 Gage datum 3,060 feet above sea level NGVD29

## Output formats

- HTML table of all data
- Tab-separated data
- Reselect output format

YEAR	Monthly mean streamflow, in ft <sup>3</sup> /s											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1979										232	279	218
1980	168	206	225	291	434	944	474	400	329	235	230	197
1981	155	158	120	101	538	1,638	461	389	346	236	193	203
1982	190	200	198	274	334	626	743	401	371	362	332	177
1983	287	350	307	187	291	1,627	599	436	304	202	201	193
1984	185	198	215	311	1,769	2,921	685	465	396	217	272	232
1985	211	177	137	297	336	364	326	207	204	169	192	201
1986	207	306	317	356	412	1,485	517	429	272	240	347	260
1987	231	153	78.0	83.3	403	559	397	353	357	305	284	164
1988	149	168	200	186	950	829	332	254	140	84.7	65.6	63.5
1989	91.3	146	215	324	304	263	355	311	224	135	75.5	76.2
1990	122	210	374	426	788	1,273	764	423	392	222	261	147
1991	162	158	173	415	1,152	1,131	505	469	240	134	145	230
1992	221	222	160	65.9	348	607	1,069	639	516	344	276	221
1993	218	206	243	197	698	1,315	553	616	335	334	209	214
1994	204	185	345	576	933	359	321	270	191	225	177	186
1995	178	201	225	263	1,277	2,519	1,269	428	437	381	261	160
1996	157	335	434	583	978	1,453	461	401	237	312	167	151
1997	165	173	354	552	974	1,827	887	676	526	311	240	193
1998	194	202	278	335	436	522	523	517	694	329	328	204

<b>1999</b>	229	181	160	122	681	2,073	634	416	282	251	214	192
<b>2000</b>	159	162	207	183	597	911	422	347	315	285	178	146
<b>2001</b>	145	154	139	120	266	225	234	168	138	105	101	100
<b>2002</b>	95.5	90.0	85.2	84.4	144	260	260	159	113			
<b>Mean of monthly streamflows</b>	LMM 179	197	226	275	654	HMM 1,119	556	399	320	246	219	180

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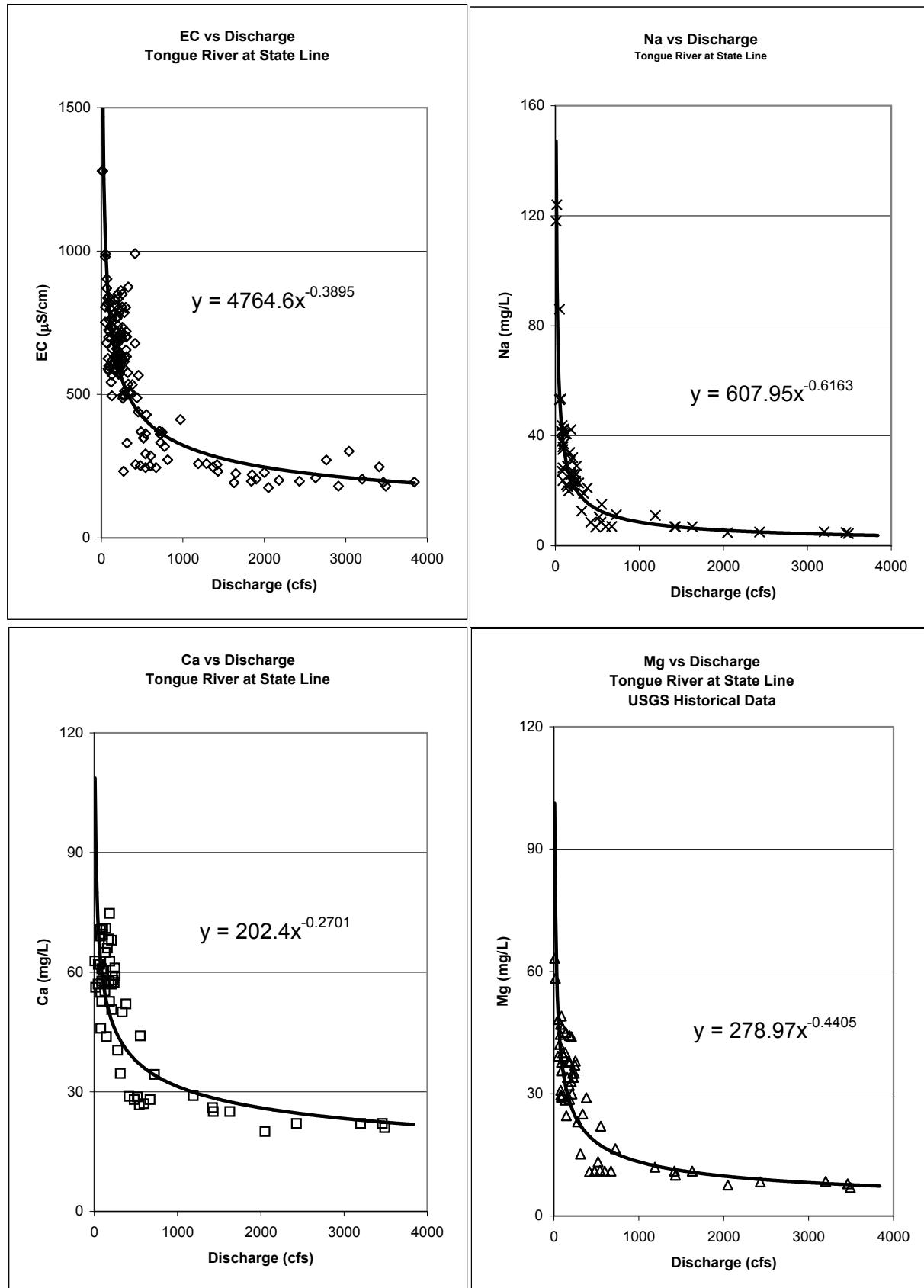
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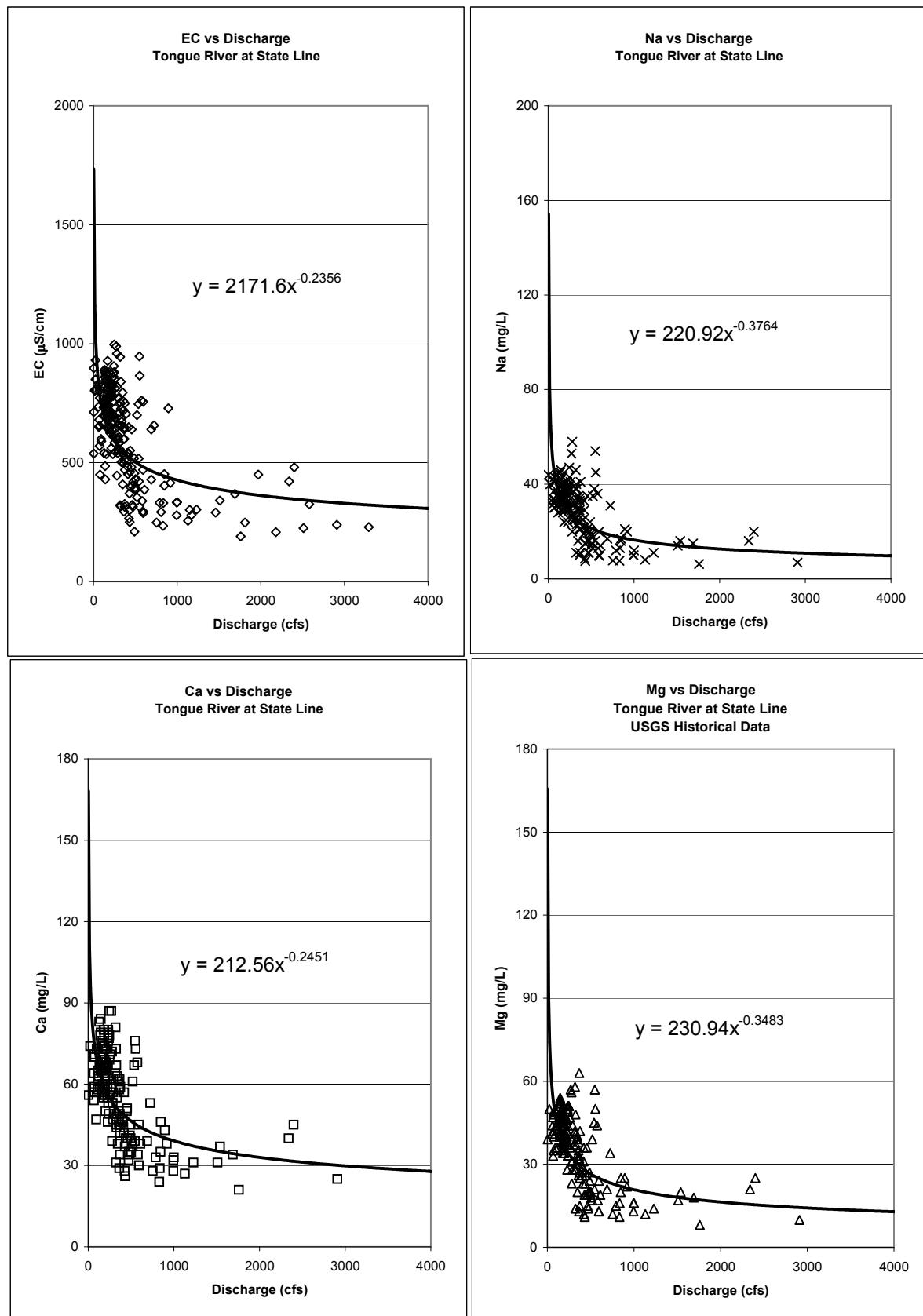
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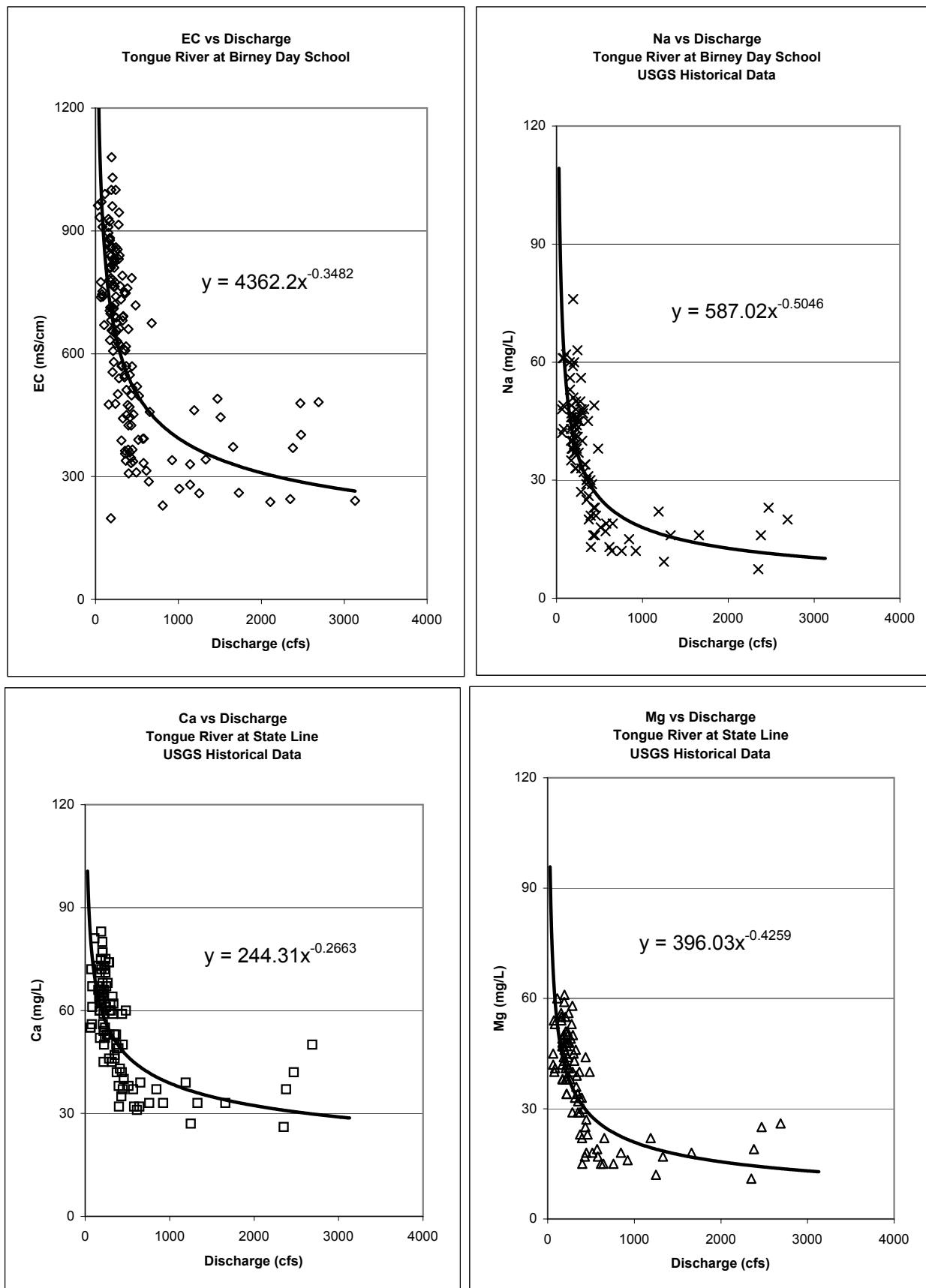
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Deltz							Monarch							Carney						
Sample	EC	TDS	Na (mg/l)	Ca (mg/l)	Mg (mg/l)	SAR	Sample	EC (lab)	TDS	Na (mg/l)	Ca (mg/l)	Mg (mg/l)	SAR	Sample	EC	TDS	Na (mg/l)	Ca (mg/l)	Mg (mg/l)	SAR
42D1-3390	2450	1520	645	6.4	3.6	50.4	34M-1091	3050	1800	629	6.4	3.5	99.3	14C-3589	3180	1700	531	4.2	1.1	54.9
FED#1	2570	1580	631	4.5	2	62.4	32M-299	1290	780	336	2.6	0.6	48.8	32C-1980	2110	1270	494	4	1.3	54.9
FED#2	1660	914	422	2.5	1.2	55.3	14M-3490	1950	1220	534	2	1	77	41C-899	1180	675	287	1.8	0.5	49.2
34D-1399	1560	914	427	2.7	1.2	54	23M-1499	1380	805	370	1.9	0.5	62.2	23C-1499	1600	894	403	2.2	0.7	61.2
23D-1499	1290	1290	313	1.6	0.7	51.9	14M-3490	1950	1220	534	2.4	1.1	71.6	32C-1499	1450	876	392	2.7	0.5	57.6
FED#4	2190	1280	578	7	3.8	43.7								14C-3299	2660	1830	759	4.2	1.8	78.1
33D-3499	2510	1610	674	8.6	3.3	49.6	Mean	1924	1165	481	9.1	1.3	71.8	33C-3499	1870	1250	527	3.4	1.5	59.8
32D-1990	1240	746	354	2.5	1	48	1 $\sigma$	701	414	123	1.9	1.2	19	32C-1990	1480	900	418	1.6	0.6	67.8
21D1-22990	1850	1090	525	3.7	1.2	61	..	5						23C-3390	1960	1190	515	5.4	1.4	51.2
23D1-3390	2280	1240	570	4.4	2	56.6								33C-3390	2120	1220	523	3.4	0.9	65
14D1-3490	2510	1440	628	5.5	3.2	52.8								14C-3490	1940	1170	538	3	1	68.7
Mean	2019	1239	525	4.5	2.1	53.2								Mean	1959	1180	490	3.3	1.0	60.8
$\pm \sigma$	505	292	126	2.2	1.2	5								$\pm \sigma$	571	349	120	1.2	0.4	9
..	11													..	..	..	..	..	..	..
50	Deltz Wells	.	.	.	.	.	18	Monarch Wells	.	.	.	.	.	18	Carney Wells	.	.	.	.	.
14	gpm/well						14	gpm/well						14	gpm/well					
700	gpm						252	gpm						252	gpm					

#### CBNG Produced Water Composition

EC	TDS	Na (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (meq/l)	Ca (meq/l)	Mg (meq/l)	SAR
1987	1211	508.06	3.93	1.73	22	0.2	0.1	53.7

## Inter-Mountain Laboratories, Inc.

**Client:** Fidelity Exploration and Production  
**Object:** Tongue River  
**Sample ID:** 42D1-3390 *Deltaz*  
**Lab ID:** 0102W24397  
**Matrix:** Water  
**Condition:** Cool/Intact

1633 Terra Avenue  
Sheridan, WY 82801

**Date Received:** 12/09/02  
**Date Reported:** 01/08/03  
**Date Sampled:** 12/09/02  
**Time Sampled:** 0840

Parameter	Analytical Result	Units	Units	PQL	Method	Date	Time	Unit
<b>Field Parameters</b>								
Field pH	7.5	s.u.		0.1	EPA 150.1			
Field Conductivity	2,420	µmhos/cm		0.1	SM 2510 B			
Field Temperature	13.1	°C		0.1	Field			
<b>General Parameters</b>								
Lab pH	8.4	s.u.		0.1	EPA 150.1	12/09/02	2008	DB
Lab Conductivity @ 25°C	2,450	µmhos/cm		1	SM 2510 B	12/09/02	2008	DB
Total Dissolved Solids @ 180°C	1,520	mg/L		10	SM 2540 C	12/10/02	0900	RM
Total Dissolved Solids(Calc)	1,550	mg/L		10	SM 1030 F.	12/20/02	1350	
Total Alkalinity as CaCO <sub>3</sub>	1,470	mg/L		1.0	SM 2320 B	12/09/02	2008	DB
Total Hardness as CaCO <sub>3</sub>	31.0	mg/L		1.0	SM 2340 B	12/18/02	1452	
Ammonia Nitrogen	2.59	mg/L		0.05	EPA 350.1	12/20/02	1703	KB
Total Phosphorus	120	µg/L		50	EPA 200.7	12/16/02	1501	BA
Sodium Adsorption Ratio	50.4			N/A	N/A	12/18/02	1452	
<b>Anions</b>								
Bicarbonate as HCO <sub>3</sub>	1,720	mg/L	28.25	meq/L	1.0	SM 2320 B	12/09/02	2008
Carbonate as CO <sub>3</sub>	36.9	mg/L	1.23	meq/L	1.0	SM 2320 B	12/09/02	2008
Hydroxide as OH	<1.0	mg/L	<0.01	meq/L	1.0	SM 2320 B	12/09/02	2008
Chloride	7.0	mg/L	0.200	meq/L	5.0	EPA 300.0	12/10/02	0831
Fluoride	2.53	mg/L	0.13	meq/L	0.08	SM 4500-F-C	12/09/02	2008
Nitrate + Nitrite as N	<0.01	mg/L	<0.01	meq/L	0.01	EPA 353.2	12/20/02	1350
Sulfate	<10	mg/L	<0.01	meq/L	10	EPA 300.0	12/10/02	0831
<b>Cations</b>								
Calcium	6.4	mg/L	0.32	meq/L	1.0	EPA 200.7	12/18/02	1452
Magnesium	3.6	mg/L	0.30	meq/L	1.0	EPA 200.7	12/18/02	1452
Kalassium	6	mg/L	0.15	meq/L	1	EPA 200.7	12/18/02	1452
Sodium	645	mg/L	28.05	meq/L	1	EPA 200.7	12/18/02	1452
								RM
<b>Ion Ratios</b>								
			28.82	meq/L	N/A	SM 1030 F.	12/18/02	1452
			29.81	meq/L	N/A	SM 1030 F.	12/20/02	1350
<b>Cation/Anion Balance</b>								
			1.69	%	N/A	SM 1030 F.	12/18/02	1452

These results only apply to the samples tested.

ference: U.S.E.P.A 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", 1983.

"Standard Methods For The Examination of Water and Wastewater", 19th ed., 1995.

**U.S.E.P.A 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes". 1993.**

EPA 600/R94/111, "Methods for the Determination of Metals in Environmental Samples-Supplement I", May 1994

## CONFIDELITY EXPLORATION &amp; PRODUCTION CO.

Page 4

Project Name: TONGUE RIVER  
 Project No.: AFE 3SAM1  
 Laboratory No.: 2003050347-3  
 Sample Name: FEDERAL #1 *Dietz*  
 Sample Date/Time: 05/27/2003 11:50:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

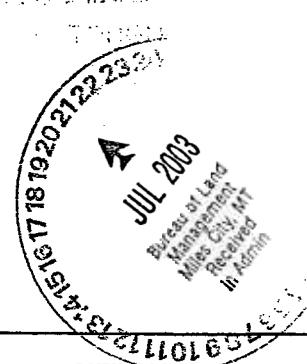


PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	7.6	S.U.	DO			
Electrical Conductivity (Field)	2560	umhos/cm	DO			
Temperature (Field)	17.9	Degrees C	DO			
pH	7.9	S.U.	CC	1.0-13.5	150.1	05/28/2003 06:10:00 PM
Electrical Conductivity	2570	umhos/cm	CC	10	2510B	06/06/2003 03:30:00 PM
Total Dissolved Solids	1580	mg/l	TB	20	160.1	05/30/2003 12:40:00 PM
Alkalinity Total as CaCO3	952	mg/l	CC	1	2320B	06/03/2003 04:18:00 PM
Hardness as CaCO3	19	mg/l		10	2340B	—
Sodium Absorption Ratio	62.4	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO3	1160	mg/l	CC	1	2320B	06/03/2003 04:18:00 PM
Alkalinity Carbonate as CO3	0	mg/l	CC	1	2320B	06/03/2003 04:18:00 PM
Alkalinity Hydroxide as OH	0	mg/l	CC	1	2320B	06/03/2003 04:18:00 PM
Chloride as Cl	6	mg/l	BH	5	325.3	06/04/2003 07:36:00 PM
Fluoride (undistilled)	3.08	mg/l	CC	0.1	4500-F-C	06/06/2003 09:23:00 AM
Nitrate + Nitrite as N	0.03	mg/l	CC	0.01	353.2	06/06/2003 04:30:00 PM
Sulfate as SO4	448	mg/l	CC	5	375.2	05/29/2003 05:48:00 PM
Ammonia (undistilled) as N	2.01	mg/l	CC	0.05	350.1	06/11/2003 05:46:00 PM
Acidity as CaCO3	19	mg/l	CC	5	305.1	06/02/2003 02:24:00 PM
Calcium as Ca	4.5	mg/l	BH	1	200.7	06/02/2003 04:53:00 PM
Magnesium as Mg	2.0	mg/l	BH	1	200.7	06/02/2003 04:53:00 PM
Potassium as K	5.7	mg/l	BH	1	200.7	06/02/2003 04:53:00 PM
Sodium as Na	631	mg/l	BH	1	200.7	06/02/2003 04:53:00 PM
Cations	28.12	meq/l		0.30	1030F	—
Anions	28.70	meq/l	—	0.38	1030F	—
Cation/Anion Balance	1.02	%	—	—	1030F	—
Methane (Headspace)	<1.0	mg/l	CJ	1.0	3810/8015B	06/02/2003 11:27:00 AM
Date Reported	06/17/2003	—				

## FIDELITY EXPLORATION &amp; PRODUCTION CO.

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Project Name: TONGUE RIVER  
 Project No.: AFE 3SAM1  
 Laboratory No.: 2003050347-2  
 Sample Name: FEDERAL #2  
 Sample Date/Time: 05/27/2003 11:10:  
 Collected by: DAVID OLSON  
 Sample Type: WATER



PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	7.8	S.U.	DO			
Electrical Conductivity (Field)	1630	umhos/cm	DO			
Temperature (Field)	16.0	Degrees C	DO	—	—	—
pH	8.1	S.U.	CC	1.0-13.5	150.1	05/28/2003 06:10:00 PM
Electrical Conductivity	1660	umhos/cm	CC	10	2510B	06/06/2003 03:30:00 PM
Total Dissolved Solids	914	mg/l	TB	20	160.1	05/30/2003 12:40:00 PM
Alkalinity Total as CaCO <sub>3</sub>	917	mg/l	CC	1	2320B	06/03/2003 04:15:00 PM
Hardness as CaCO <sub>3</sub>	11	mg/l		10	2340B	—
Sodium Absorption Ratio	55.3	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	1120	mg/l	CC	1	2320B	06/03/2003 04:15:00 PM
Alkalinity Carbonate as CO <sub>3</sub>	0	mg/l	CC	1	2320B	06/03/2003 04:15:00 PM
Alkalinity Hydroxide as OH	0	mg/l	CC	1	2320B	06/03/2003 04:15:00 PM
Chloride as Cl	18	mg/l	HB	5	325.3	06/04/2003 07:35:00 PM
Fluoride (undistilled)	5.25	mg/l	CC	0.1	4500-F-C	06/06/2003 09:23:00 AM
Nitrate + Nitrite as N	0.02	mg/l	CC	0.01	353.2	06/06/2003 04:30:00 PM
Sulfate as SO <sub>4</sub>	16	mg/l	CC	5	375.2	05/29/2003 05:48:00 PM
Ammonia (undistilled) as N	1.18	mg/l	CC	0.05	350.1	06/11/2003 05:46:00 PM
Acidity as CaCO <sub>3</sub>	<5	mg/l	CC	5	305.1	06/02/2003 02:22:00 PM
Calcium as Ca	2.5	mg/l	BH	1	200.7	06/02/2003 04:51:00 PM
Magnesium as Mg	1.2	mg/l	BH	1	200.7	06/02/2003 04:51:00 PM
Potassium as K	4.3	mg/l	BH	1	200.7	06/02/2003 04:51:00 PM
Sodium as Na	422	mg/l	BH	1	200.7	06/02/2003 04:51:00 PM
Cations	18.79	meq/l		0.30	1030F	—
Anions	19.46	meq/l		0.38	1030F	—
Cation/Anion Balance	1.75	%	—	—	1030F	—
Methane (Headspace)	11.3	mg/l	CJ	1.0	3810/8015B	06/02/2003 11:27:00 AM
Date Reported	06/17/2003					

## FIDELITY EXPLORATION &amp; PRODUCTION CO.

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Project Name: TONGUE RIVER - MT  
 Project No.: AFE 3SAM2  
 Laboratory No.: 2003050159-17  
 Sample Name: 34D-1399 *D. Olson*  
 Sample Date/Time: 05/13/2003 16:52:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	7.7	S.U.	DO			
Electrical Conductivity (Field)	1630	umhos/cm	DO			
Temperature (Field)	16.0	Degrees C	DO			
pH	8.0	S.U.	HHB	1.0-13.5	150.1	05/15/2003 06:16:00 PM
Electrical Conductivity	1560	umhos/cm	TB	10	2510B	05/29/2003 09:10:00 AM
Total Dissolved Solids	914	mg/l	TB	20	160.1	05/16/2003 11:30:00 AM
Alkalinity Total as CaCO <sub>3</sub>	858	mg/l	CC	1	2320B	05/23/2003 01:52:00 PM
Hardness as CaCO <sub>3</sub>	12	mg/l		10	2340B	---
Sodium Absorption Ratio	54.0	units	—	0.2	S-1.60	---
Alkalinity Bicarbonate as HCO <sub>3</sub>	1020	mg/l	CC	1	2320B	05/23/2003 01:52:00 PM
Alkalinity Carbonate as CO <sub>3</sub>	14	mg/l	CC	1	2320B	05/23/2003 01:52:00 PM
Alkalinity Hydroxide as OH	0	mg/l	CC	1	2320B	05/23/2003 01:52:00 PM
Chloride as Cl	<5	mg/l	HB	5	325.3	05/27/2003 05:20:00 PM
Fluoride (undistilled)	4.18	mg/l	HB	0.1	4500-F-C	05/28/2003 05:02:00 PM
Nitrate + Nitrite as N	0.03	mg/l	CC	0.01	353.2	06/02/2003 12:58:00 PM
Sulfate as SO <sub>4</sub>	9	mg/l	CC	5	375.2	05/28/2003 05:46:00 PM
Ammonia (undistilled) as N	0.75	mg/l	CC	0.05	350.1	05/20/2003 12:50:00 PM
Acidity as CaCO <sub>3</sub>	8	mg/l	HB	5	305.2	05/20/2003 04:37:00 PM
Calcium as Ca	2.7	mg/l	BH	1	200.7	05/16/2003 01:11:14 PM
Magnesium as Mg	1.2	mg/l	BH	1	200.7	05/16/2003 01:11:14 PM
Potassium as K	3.8	mg/l	BH	1	200.7	05/16/2003 01:11:14 PM
Sodium as Na	427	mg/l	BH	1	200.7	05/16/2003 01:11:14 PM
Cations	19.12	meq/l	—	0.30	1030F	---
Anions	17.57	meq/l		0.38	1030F	---
Cation/Anion Balance	4.22	%	—	—	1030F	---
Methane (Headspace)	11.7	mg/l	CJ	1.0	3810/8015B	05/23/2003 08:12:00 AM
Date Reported	06/03/2003	—				

Project Name: TONGUE RIVER MT.  
 Project No.: AFE 3SAM1  
 Laboratory No.: 2003040144-12  
 Sample Name: 23D-1499 Dietz  
 Sample Date: 04/14/2003  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	7.8	S.U.	DO			
Electrical Conductivity (Field)	1380	umhos/cm	DO			
Temperature (Field)	16.5	Degrees C	DO			
pH	7.9	S.U.	HB	1.0-13.5	150.1	04/15/2003 04:37:00 PM
Electrical Conductivity	1290	umhos/cm	TB	10	2510B	04/19/2003 11:40:00 AM
Total Dissolved Solids	802	mg/l	CC	20	160.1	04/15/2003 05:10:00 PM
Alkalinity Total as CaCO <sub>3</sub>	689	mg/l	HB	1	2320B	04/25/2003 03:57:00 PM
Hardness as CaCO <sub>3</sub>	<10	mg/l	CC	10	2340B	04/18/2003 02:54:30 PM
Sodium Absorption Ratio	51.9	units	CC	0.2	S-1.60	04/18/2003 02:54:30 PM
Alkalinity Bicarbonate as HCO <sub>3</sub>	841	mg/l	HB	1	2320B	04/25/2003 03:57:00 PM
Alkalinity Carbonate as CO <sub>3</sub>	0	mg/l	HB	1	2320B	04/25/2003 03:57:00 PM
Alkalinity Hydroxide as OH	0	mg/l	HB	1	2320B	04/25/2003 03:57:00 PM
Chloride as Cl	6	mg/l	HB	5	325.3	04/24/2003 02:53:00 PM
Fluoride (undistilled)	4.54	mg/l	BB	0.1	4500-F-C	04/24/2003 11:11:00 AM
Nitrate + Nitrite as N	0.03	mg/l	CC	0.01	353.2	04/15/2003 04:36:00 PM
Sulfate as SO <sub>4</sub>	30	mg/l	CC	10	375.2	04/23/2003 07:19:00 PM
Ammonia (undistilled) as N	0.89	mg/l	CC	0.05	350.1	04/18/2003 10:51:00 AM
Acidity as CaCO <sub>3</sub>	8J	mg/l	HB	5	305.2	04/18/2003 02:03:00 PM
Calcium as Ca	1.6	mg/l	BH	1	200.7	04/18/2003 02:54:30 PM
Magnesium as Mg	0.7	mg/l	BH	1	200.7	04/18/2003 02:54:30 PM
Potassium as K	3.1	mg/l	BH	1	200.7	04/18/2003 02:54:30 PM
Sodium as Na	313	mg/l	BH	1	200.7	04/18/2003 02:54:30 PM
Cations	14.05	meq/l		0.30	1030F	—
Anions	14.81	meq/l		0.38	1030F	—
Cation/Anion Balance	2.62	%	—	—	1030F	—
Methane (Headspace)	22.9 J	mg/l	CJ	1.0	3810/8015B	04/16/2003 07:22:00 AM
Methane (Zero Headspace)	7.9	mg/l	CJ	1.0	3810/8015B	04/16/2003 07:22:00 AM

## FIDELITY EXPLORATION &amp; PRODUCTION CO.

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Project Name: TONGUE RIVER - MT  
 Project No.: AFE 3SAM1  
 Laboratory No.: 2003060016-1  
 Sample Name: FEDERAL #4 *Dietz*  
 Sample Date/Time: 05/30/2003 13:23:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	7.5	S.U.	DO			
Electrical Conductivity (Field)	2110	umhos/cm	DO			
Temperature (Field)	16.3	Degrees C	DO	—	—	—
pH	7.7	S.U.	HB	1.0-13.5	150.1	06/03/2003 06:00:00 PM
Electrical Conductivity	2190	umhos/cm	TB	10	2510B	06/10/2003 10:40:00 AM
Total Dissolved Solids	1280	mg/l	TB	20	160.1	06/04/2003 11:15:00 AM
Alkalinity Total as CaCO <sub>3</sub>	1330	mg/l	AH	1	2320B	06/12/2003 09:09:00 AM
Hardness as CaCO <sub>3</sub>	33	mg/l		10	2340B	—
Sodium Absorption Ratio	43.7	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	1620	mg/l	AH	1	2320B	06/12/2003 09:09:00 AM
Alkalinity Carbonate as CO <sub>3</sub>	0	mg/l	AH	1	2320B	06/12/2003 09:09:00 AM
Alkalinity Hydroxide as OH	0	mg/l	AH	1	2320B	06/12/2003 09:09:00 AM
Chloride as Cl	12	mg/l	HB	5	325.3	06/13/2003 02:47:00 PM
Fluoride (undistilled)	2.13	mg/l	CC	0.1	4500-F-C	06/06/2003 02:44:00 PM
Nitrate + Nitrite as N	0.02	mg/l	CC	0.01	353.2	06/06/2003 04:51:00 PM
Sulfate as SO <sub>4</sub>	17	mg/l	CC	5	375.2	06/16/2003 06:20:00 PM
Ammonia (undistilled) as N	2.19	mg/l	CC	0.05	350.1	06/11/2003 06:08:00 PM
Acidity as CaCO <sub>3</sub>	8	mg/l	CC	5	305.1	06/13/2003 08:40:00 AM
Calcium as Ca	7.0	mg/l	BH	1	200.7	06/04/2003 12:09:00 PM
Magnesium as Mg	3.8	mg/l	BH	1	200.7	06/04/2003 12:09:00 PM
Potassium as K	5.9	mg/l	BH	1	200.7	06/04/2003 12:09:00 PM
Sodium as Na	578	mg/l	BH	1	200.7	06/04/2003 12:09:00 PM
Cations	26.27	meq/l		0.30	1030F	—
Anions	27.40	meq/l		0.38	1030F	—
Cation/Anion Balance	2.10	%	—	—	1030F	—
Methane (Headspace)	32.6	mg/l	CJ	1.0	3810/8015B	06/05/2003 08:35:00 AM
Date Reported	07/02/2003					

Project Name: TONGUE RIVER MT

Project No.: AFE 3SAM1

Laboratory No.: 2003040173-8

Sample Name: 33D-3499 Dietz

Sample Date: 04/16/2003

Collected by: DAVID OLSON

Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	7.6	S.U.	DO	—		
Electrical Conductivity (Field)	2710	umhos/cm	DO			
Temperature (Field)	17.2	Degrees C	DO			
pH	7.7	S.U.	HB	1.0-13.5	150.1	04/18/2003 04:41:00 PM
Electrical Conductivity	2510	umhos/cm	TB	10	2510B	04/18/2003 03:45:00 PM
Total Dissolved Solids	1610	mg/l	TB	20	160.1	04/19/2003 10:30:00 AM
Alkalinity Total as CaCO <sub>3</sub>	1250	mg/l	HB	1	2320B	04/25/2003 11:03:00 AM
Hardness as CaCO <sub>3</sub>	35	mg/l		10	2340B	—
Sodium Absorption Ratio	49.6	units	—	—	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	1530	mg/l	CC	1	2320B	04/25/2003 11:07:00 AM
Alkalinity Carbonate as CO <sub>3</sub>	0	mg/l	HB	1	2320B	04/25/2003 11:07:00 AM
Alkalinity Hydroxide as OH	0	mg/l	HB	1	2320B	04/25/2003 11:07:00 AM
Chloride as Cl	22	mg/l	TB	5	325.3	04/29/2003 10:50:00 AM
Fluoride (undistilled)	3.17	mg/l	BB	0.1	4500-F-C	04/24/2003 02:27:00 PM
Nitrate + Nitrite as N	<0.01	mg/l	HB	0.01	353.2	04/22/2003 09:20:00 AM
Sulfate as SO <sub>4</sub>	220	mg/l	CC	10	375.2	04/25/2003 02:08:00 PM
Ammonia (undistilled) as N	2.2	mg/l	CC	0.05	351.2	04/30/2003 04:40:00 PM
Acidity as CaCO <sub>3</sub>	8	mg/l	HB	5	305.2	04/28/2003 02:03:00 PM
Calcium as Ca	8.6	mg/l	BH	1	200.7	04/23/2003 01:47:07 PM
Magnesium as Mg	3.3	mg/l	BH	1	200.7	04/23/2003 01:47:07 PM
Potassium as K	6.8	mg/l	BH	1	200.7	04/23/2003 01:47:07 PM
Sodium as Na	674	mg/l	BH	1	200.7	04/23/2003 01:47:07 PM
Cations	30.51	meq/l		0.30	1030F	
Anions	29.95	meq/l		0.38	1030F	—
Cation/Anion Balance	0.92	%	—	—	1030F	
Methane (Headspace)	<1.0	mg/l	CJ	1.0	3810/8015B	04/24/2003 07:44:00 AM
Methane (Zero Headspace)	<1.0	mg/l	CJ	1.0	3810/8015B	04/24/2003 07:44:00 AM

## FIDELITY EXPLORATION &amp; PRODUCTION CO.

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Project Name: TONGUE RIVER - MT  
 Project No.: AFE 3SAM2  
 Laboratory No.: 2003050159-13  
 Sample Name: 32D-1990 D/efz  
 Sample Date/Time: 05/13/2003 14:39:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	7.7	S.U.	DO			—
Electrical Conductivity (Field)	1320	umhos/cm	DO			—
Temperature (Field)	16.8	Degrees C	DO			—
pH	8.0	S.U.	HHB	1.0-13.5	150.1	05/15/2003 06:10:00 PM
Electrical Conductivity	1240	umhos/cm	TB	10	2510B	05/29/2003 09:10:00 AM
Total Dissolved Solids	746	mg/l	TB	20	160.1	05/16/2003 11:30:00 AM
Alkalinity Total as CaCO <sub>3</sub>	752	mg/l	CC	1	2320B	05/23/2003 01:36:00 PM
Hardness as CaCO <sub>3</sub>	10	mg/l	—	10	2340B	—
Sodium Absorption Ratio	48.0	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	889	mg/l	CC	1	2320B	05/23/2003 01:36:00 PM
Alkalinity Carbonate as CO <sub>3</sub>	14	mg/l	CC	1	2320B	05/23/2003 01:36:00 PM
Alkalinity Hydroxide as OH	0	mg/l	CC	1	2320B	05/23/2003 01:36:00 PM
Chloride as Cl	<5	mg/l	HB	5	325.3	05/27/2003 05:00:00 PM
Fluoride (undistilled)	6.88	mg/l	HB	0.1	4500-F-C	05/28/2003 05:02:00 PM
Nitrate + Nitrite as N	0.02	mg/l	CC	0.01	353.2	06/02/2003 12:58:00 PM
Sulfate as SO <sub>4</sub>	6	mg/l	CC	5	375.2	05/28/2003 05:46:00 PM
Ammonia (undistilled) as N	0.67	mg/l	CC	0.05	350.1	05/20/2003 12:50:00 PM
Acidity as CaCO <sub>3</sub>	8	mg/l	HB	5	305.2	05/20/2003 04:26:00 PM
Calcium as Ca	2.5	mg/l	BH	1	200.7	05/16/2003 12:54:20 PM
Magnesium as Mg	1.0	mg/l	BH	1	200.7	05/16/2003 12:54:20 PM
Potassium as K	3.0	mg/l	BH	1	200.7	05/16/2003 12:54:20 PM
Sodium as Na	354	mg/l	BH	1	200.7	05/16/2003 12:54:20 PM
Cations	15.87	meq/l		0.30	1030F	—
Anions	15.53	meq/l		0.38	1030F	—
Cation/Anion Balance	1.08	%	—	—	1030F	—
Methane (Headspace)	33.1	mg/l	CJ	1.0	3810/8015B	05/23/2003 08:12:00 AM
Date Reported	06/03/2003	—				

Name: TONGUE RIVER MT  
 Project No.: AFE 3SAM1  
 Laboratory No.: 2003040261-2  
 Sample Name: 31D1/2-2990 *Dietz*  
 Sample Date/Time: 04/24/2003 14:05:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	8.0	S.U.	DO			
Electrical Conductivity (Field)	2000	umhos/cm	DO			
Temperature (Field)	16.0	Degrees C	DO	—		
pH	8.0	S.U.	HB	1.0-13.5	150.1	04/28/2003 05:56:00 PM
Electrical Conductivity	1950	umhos/cm	TB	10	2510B	04/28/2003 03:30:00 PM
Total Dissolved Solids	1090	mg/l	KW	20	160.1	04/30/2003 03:30:00 PM
Alkalinity Total as CaCO <sub>3</sub>	1070	mg/l	HB	1	2320B	05/05/2003 04:44:00 PM
Hardness as CaCO <sub>3</sub>	14	mg/l		10	2340B	—
Sodium Absorption Ratio	61.0	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	1300	mg/l	HB	1	2320B	05/05/2003 04:44:00 PM
Alkalinity Carbonate as CO <sub>3</sub>	0	mg/l	HB	1	2320B	05/05/2003 04:44:00 PM
Alkalinity Hydroxide as OH	0	mg/l	HB	1	2320B	05/05/2003 04:44:00 PM
Chloride as Cl	20	mg/l	TB	5	325.3	04/30/2003 08:15:00 AM
Fluoride (undistilled)	3.45	mg/l	CC	0.1	4500-F-C	05/07/2003 12:54:00 PM
Nitrate + Nitrite as N	<0.01	mg/l	HB	0.01	353.2	05/07/2003 01:05:00 PM
Sulfate as SO <sub>4</sub>	<10	mg/l	CC	10	375.2	05/09/2003 12:49:00 PM
Ammonia (undistilled) as N	1.48	mg/l	CC	0.05	350.1	04/30/2003 06:44:00 PM
Acidity as CaCO <sub>3</sub>	<5	mg/l	CC	5	305.1	05/07/2003 04:15:00 PM
Calcium as Ca	3.7	mg/l	BH	1	200.7	04/29/2003 01:23:16 PM
Magnesium as Mg	1.2	mg/l	BH	1	200.7	04/29/2003 01:23:16 PM
Potassium as K	4.8	mg/l	BH	1	200.7	04/29/2003 01:23:16 PM
Sodium as Na	528	mg/l	BH	1	200.7	04/29/2003 01:23:16 PM
Cations	23.48	meq/l		0.30	1030F	—
Anions	22.14	meq/l		0.38	1030F	—
Cation/Anion Balance	2.94	%	—	—	1030F	—
Methane (Headspace)	13.5	mg/l	CJ	1.0	3810/8015B	05/08/2003 07:55:00 AM
Date Reported	05/12/03					

## FIDELITY EXPLORATION &amp; PRODUCTION CO.

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Project Name: TONGUE RIVER, MT  
 Project No.: AFE 3SAM 2  
 Laboratory No.: 2003050374-1  
 Sample Name: 23D1-3390 Dietz  
 Sample Date/Time: 05/28/2003 08:10:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	7.7	S.U.	DO			
Electrical Conductivity (Field)	2110	umhos/cm	DO			
Temperature (Field)	15.4	Degrees C	DO	—	—	—
pH	8.1	S.U.	TB	1.0-13.5	150.1	05/30/2003 04:35:00 PM
Electrical Conductivity	2280	umhos/cm	TB	10	2510B	06/10/2003 10:40:00 AM
Total Dissolved Solids	1240 J	mg/l	TB	20	160.1	06/19/2003 10:00:00 AM
Alkalinity Total as CaCO <sub>3</sub>	1200	mg/l	CC	1	2320B	06/03/2003 05:18:00 PM
Hardness as CaCO <sub>3</sub>	19	mg/l		10	2340B	—
Sodium Absorption Ratio	56.6	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	1460	mg/l	CC	1	2320B	06/03/2003 05:18:00 PM
Alkalinity Carbonate as CO <sub>3</sub>	0	mg/l	CC	1	2320B	06/03/2003 05:18:00 PM
Alkalinity Hydroxide as OH	0	mg/l	CC	1	2320B	06/03/2003 05:18:00 PM
Chloride as Cl	10	mg/l	HB	5	325.3	06/13/2003 01:49:00 PM
Fluoride (undistilled)	1.59	mg/l	CC	0.1	4500-F-C	06/06/2003 10:28:00 AM
Nitrate + Nitrite as N	0.01	mg/l	CC	0.01	353.2	06/06/2003 04:39:00 PM
Sulfate as SO <sub>4</sub>	<5	mg/l	CC	5	375.3	06/10/2003 08:45:00 AM
Ammonia (undistilled) as N	2.25	mg/l	CC	0.05	350.1	06/11/2003 05:58:00 PM
Acidity as CaCO <sub>3</sub>	12	mg/l	CC	5	305.2	06/02/2003 02:40:00 PM
Calcium as Ca	4.4	mg/l	BH	1	200.7	06/02/2003 05:39:00 PM
Magnesium as Mg	2.0	mg/l	BH	1	200.7	06/02/2003 05:39:00 PM
Potassium as K	5.9	mg/l	BH	1	200.7	06/02/2003 05:39:00 PM
Sodium as Na	570	mg/l	BH	1	200.7	06/02/2003 05:39:00 PM
Cations	25.73	meq/l		0.30	1030F	—
Anions	24.36	meq/l		0.38	1030F	—
Cation/Anion Balance	2.74	%	—	—	1030F	—
Methane (Headspace)	31.4	mg/l	CJ	1.0	3810/8015B	06/02/2003 11:27:00 AM
Date Reported	06/23/2003					

Site: TONGUE RIVER-MT  
 Project No.: AFE 3SAM2  
 Laboratory No.: 2003050277-4  
 Sample Name: 14D1-3490 De.4z  
 Sample Date/Time: 05/21/2003 14:35:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	7.9	S.U.	DO			
Electrical Conductivity (Field)	2370	umhos/cm	DO			
Temperature (Field)	15.7	Degrees C	DO	—		
pH	8.0	S.U.	TB	1.0-13.5	150.1	05/23/2003 12:00:00 AM
Electrical Conductivity	2510	umhos/cm	TB	10	2510B	06/05/2003 11:15:00 AM
Total Dissolved Solids	1440	mg/l	CC	20	160.1	05/27/2003 07:40:00 PM
Alkalinity Total as CaCO <sub>3</sub>	1360	mg/l	CC	1	2320B	06/02/2003 05:03:00 PM
Hardness as CaCO <sub>3</sub>	27	mg/l		10	2340B	
Sodium Absorption Ratio	52.8	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	1660	mg/l	CC	1	2320B	06/02/2003 05:03:00 PM
Alkalinity Carbonate as CO <sub>3</sub>	0	mg/l	CC	1	2320B	06/02/2003 05:03:00 PM
Alkalinity Hydroxide as OH	0	mg/l	CC	1	2320B	06/02/2003 05:03:00 PM
Chloride as Cl	10	mg/l	HB	5	325.3	06/04/2003 05:44:00 PM
Fluoride (undistilled)	2.66	mg/l	HB	0.1	4500-F-C	06/05/2003 01:20:00 PM
Nitrate + Nitrite as N	0.04	mg/l	CC	0.01	353.2	06/06/2003 04:00:00 PM
Sulfate as SO <sub>4</sub>	16	mg/l	CC	5	375.2	05/29/2003 03:02:00 PM
Ammonia (undistilled) as N	2.16	mg/l	CC	0.05	350.1	06/11/2003 04:23:00 PM
Acidity as CaCO <sub>3</sub>	21	mg/l	HB	5	305.2	05/29/2003 05:13:00 PM
Calcium as Ca	5.5	mg/l	BH	1	200.7	05/27/2003 05:15:00 AM
Magnesium as Mg	3.2	mg/l	BH	1	200.7	05/27/2003 05:15:00 AM
Potassium as K	5.9	mg/l	BH	1	200.7	05/27/2003 05:15:00 AM
Sodium as Na	628	mg/l	BH	1	200.7	05/27/2003 05:15:00 AM
Cations	28.58	meq/l		0.30	1030F	
Anions	27.96	meq/l		0.38	1030F	—
Cation/Anion Balance	1.10	%	—	—	1030F	—
Methane (Headspace)	31.7	mg/l	CJ	1.0	3810/8015B	05/27/2003 10:23:00 AM
Date Reported	06/16/2003					

Project Name: TONGUE RIVER  
 Project No.: AFE 3SAM1  
 Laboratory No.: 2003060207-3  
 Sample Name: 34M-1091 *Monarch*  
 Sample Date/Time: 06/17/2003 12:51:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	7.8	S.U.	DO			
Electrical Conductivity (Field)	2950	umhos/cm	DO			
Temperature (Field)	17.3	Degrees C	DO	—		
pH	7.9	S.U.	CC	1.0-13.5	150.1	06/20/2003 04:45:00 PM
Electrical Conductivity	3050	umhos/cm	TB	10	2510B	06/27/2003 02:15:00 PM
Total Dissolved Solids	1800	mg/l	CC	20	160.1	06/24/2003 02:45:00 PM
Alkalinity Total as CaCO <sub>3</sub>	1750	mg/l	CC	1	2320B	06/27/2003 09:00:00 AM
Hardness as CaCO <sub>3</sub>	13	mg/l		10	2340B	—
Sodium Absorption Ratio	99.3	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	2080	mg/l	CC	1	2320B	06/27/2003 09:00:00 AM
Alkalinity Carbonate as CO <sub>3</sub>	28	mg/l	CC	1	2320B	06/27/2003 09:00:00 AM
Alkalinity Hydroxide as OH	0	mg/l	CC	1	2320B	06/27/2003 09:00:00 AM
Chloride as Cl	6	mg/l	TB	5	325.3	06/26/2003 09:25:00 AM
Fluoride (undistilled)	5.60	mg/l	HB	0.1	4500-F-C	06/25/2003 04:43:00 PM
Nitrate + Nitrite as N	<0.01	mg/l	HB	0.01	353.2	07/03/2003 12:41:00 PM
Sulfate as SO <sub>4</sub>	14	mg/l	CC	5	375.2	06/30/2003 04:14:00 PM
Ammonia (undistilled) as N	2.39	mg/l	CC	0.05	350.1	06/23/2003 06:08:00 PM
Acidity as CaCO <sub>3</sub>	13	mg/l	HB	5	305.2	07/01/2003 04:30:00 PM
Calcium as Ca	3.4	mg/l	BH	1	200.7	06/30/2003 11:41:00 AM
Magnesium as Mg	1.1	mg/l	BH	1	200.7	06/30/2003 11:41:00 AM
Potassium as K	12	mg/l	BH	1	200.7	06/30/2003 11:41:00 AM
Sodium as Na	823	mg/l	BH	1	200.7	06/30/2003 11:44:00 AM
Cations	36.80	meq/l		0.30	1030F	—
Anions	35.74	meq/l		0.38	1030F	—
Cation/Anion Balance	1.45	%	—	—	1030F	—
Methane (Headspace)	52.9	mg/l	CJ	1.0	3810/8015B	06/24/2003 08:56:00 AM
Date Reported	07/09/03					

## FIDELITY EXPLORATION &amp; PRODUCTION CO.

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Project Name: TONGUE RIVER  
 Project No.: AFE 3SAM1  
 Laboratory No.: 2003060131-2  
 Sample Name: 32M-299 *Monarch*  
 Sample Date/Time: 06/09/2003 09:10:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	7.9	S.U.	DO			
Electrical Conductivity (Field)	1410	umhos/cm	DO			
Temperature (Field)	18.9	Degrees C	DO	—	—	—
pH	8.3	S.U.	CC	1.0-13.5	150.1	06/12/2003 06:55:00 PM
Electrical Conductivity	1290	umhos/cm	TB	10	2510B	06/19/2003 09:05:00 AM
Total Dissolved Solids	780	mg/l	CC	20	160.1	06/16/2003 04:15:00 PM
Alkalinity Total as CaCO <sub>3</sub>	787	mg/l	AH	1	2320B	06/19/2003 09:18:00 AM
Hardness as CaCO <sub>3</sub>	<10	mg/l		10	2340B	—
Sodium Absorption Ratio	48.8	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	932	mg/l	AH	1	2320B	06/19/2003 09:18:00 AM
Alkalinity Carbonate as CO <sub>3</sub>	14	mg/l	AH	1	2320B	06/19/2003 09:18:00 AM
Alkalinity Hydroxide as OH	0	mg/l	AH	1	2320B	06/19/2003 09:18:00 AM
Chloride as Cl	<5	mg/l	HB	5	325.3	06/16/2003 06:09:00 PM
Fluoride (undistilled)	5.38	mg/l	HB	0.1	4500-F-C	06/25/2003 04:08:00 PM
Nitrate + Nitrite as N	0.02	mg/l	CC	0.01	353.2	07/02/2003 01:01:00 PM
Sulfate as SO <sub>4</sub>	7	mg/l	CC	5	375.2	06/18/2003 09:26:00 AM
Ammonia (undistilled) as N	1.00	mg/l	CC	0.05	350.1	06/23/2003 05:12:00 PM
Acidity as CaCO <sub>3</sub>	<5	mg/l	AH	5	305.1	06/13/2003 10:06:00 AM
Calcium as Ca	2.6	mg/l	BH	1	200.7	06/20/2003 03:55:00 PM
Magnesium as Mg	0.6J	mg/l	BH	1	200.7	06/20/2003 03:55:00 PM
Potassium as K	3.9	mg/l	BH	1	200.7	06/20/2003 03:55:00 PM
Sodium as Na	336	mg/l	BH	1	200.7	06/30/2003 11:09:00 AM
Cations	14.97	meq/l		0.30	1030F	—
Anions	16.16	meq/l		0.38	1030F	—
Cation/Anion Balance	3.85	%	—	—	1030F	—
Methane (Headspace)	4.5	mg/l	CJ	1.0	3810/8015B	06/18/2003 10:46:00 AM
Date Reported	07/02/2003	—				

Name: TONGUE RIVER MT  
 Project No.: AFE 3SAM1  
 Laboratory No.: 2003040156-12  
 Sample Name: 14M-3490 Monarch  
 Sample Date: 04/15/2003  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	7.9	S.U.	DO			
Electrical Conductivity (Field)	2160	umhos/cm	DO			
Temperature (Field)	20.0	Degrees C	DO	---		
pH	8.1	S.U.	HB	1.0-13.5	150.1	04/16/2003 05:05:00 PM
Electrical Conductivity	1950	umhos/cm	TB	10	2510B	04/18/2003 03:45:00 PM
Total Dissolved Solids	1220	mg/l	TB	20	160.1	04/17/2003 03:05:00 PM
Alkalinity Total as CaCO <sub>3</sub>	1210	mg/l	HB	1	2320B	04/17/2003 04:53:00 PM
Hardness as CaCO <sub>3</sub>	<10	mg/l	BH	10	2340B	04/18/2003 04:59:00 PM
Sodium Absorption Ratio	77.0	units	BH	0.2	S-1.60	04/18/2003 04:59:00 PM
Alkalinity Bicarbonate as HCO <sub>3</sub>	1470	mg/l	HB	1	2320B	04/17/2003 04:53:00 PM
Alkalinity Carbonate as CO <sub>3</sub>	0	mg/l	HB	1	2320B	04/17/2003 04:53:00 PM
Alkalinity Hydroxide as OH	0	mg/l	HB	1	2320B	04/17/2003 04:53:00 PM
Chloride as Cl	22	mg/l	TB	5	325.3	04/29/2003 10:50:00 AM
Fluoride (undistilled)	2.87	mg/l	BB	0.1	4500-F-C	04/24/2003 02:27:00 PM
Nitrate + Nitrite as N	<0.01	mg/l	HB	0.01	353.2	04/22/2003 08:50:00 AM
Sulfate as SO <sub>4</sub>	<10	mg/l	CC	10	375.2	04/25/2003 01:56:59 PM
Ammonia (undistilled) as N	1.69	mg/l	CC	0.05	350.1	04/18/2003 10:21:00 AM
Acidity as CaCO <sub>3</sub>	20	mg/l	HB	5	305.2	04/18/2003 04:03:00 PM
Calcium as Ca	2	mg/l	BH	1	200.7	04/18/2003 04:59:48 PM
Magnesium as Mg	1	mg/l	BH	1	200.7	04/18/2003 04:59:48 PM
Potassium as K	5	mg/l	BH	1	200.7	04/18/2003 04:59:48 PM
Sodium as Na	534	mg/l	BH	1	200.7	04/18/2003 04:59:48 PM
Cations	24.06	meq/l	—	0.30	1030F	—
Anions	24.96	meq/l	—	0.38	1030F	—
Cation/Anion Balance	2.26	%	—	—	CALC	—
Methane (Headspace)	21.9	mg/l	CJ	1.0	3810/8015B	04/17/2003 11:12:00 AM
Methane (Zero Headspace)	NA	—	—	—	—	—

## FIDELITY EXPLORATION &amp; PRODUCTION CO.

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Name: TONGUE RIVER  
 Project No.: AFE 3SAM2  
 Laboratory No.: 2003050217-4  
 Sample Name: 23M-1499 *Monarch*  
 Sample Date/Time: 05/16/2003 11:18:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	8.0	S.U.	DO	—	—	—
Electrical Conductivity (Field)	1430	umhos/cm	DO	—	—	—
Temperature (Field)	16.7	Degrees C	DO	—	—	—
pH	8.2	S.U.	HB	1.0-13.5	150.1	05/20/2003 06:48:00 PM
Electrical Conductivity	1380	umhos/cm	TB	10	2510B	05/29/2003 09:10:00 AM
Total Dissolved Solids	805	mg/l	TB	20	160.1	05/23/2003 09:05:00 AM
Alkalinity Total as CaCO <sub>3</sub>	893	mg/l	CC	1	2320B	05/30/2003 10:32:00 AM
Hardness as CaCO <sub>3</sub>	<10	mg/l	—	10	2340B	—
Sodium Absorption Ratio	62.2	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	1090	mg/l	CC	1	2320B	05/30/2003 10:32:00 AM
Alkalinity Carbonate as CO <sub>3</sub>	0	mg/l	CC	1	2320B	05/30/2003 10:32:00 AM
Alkalinity Hydroxide as OH	0	mg/l	CC	1	2320B	05/30/2003 10:32:00 AM
Chloride as Cl	<5	mg/l	HB	5	325.3	05/27/2003 06:21:00 PM
Fluoride (undistilled)	5.85	mg/l	CC	0.1	4500-F-C	05/30/2003 11:51:00 AM
Nitrate + Nitrite as N	0.01	mg/l	CC	0.01	353.2	06/02/2003 03:57:00 PM
Sulfate as SO <sub>4</sub>	8	mg/l	CC	5	375.2	05/28/2003 07:37:00 PM
Ammonia (undistilled) as N	0.45	mg/l	CC	0.05	350.1	05/28/2003 09:50:00 AM
Acidity as CaCO <sub>3</sub>	<5	mg/l	HB	5	305.2	05/29/2003 04:57:00 PM
Calcium as Ca	1.9	mg/l	BH	1	200.7	05/27/2003 01:48:00 AM
Magnesium as Mg	0.5J	mg/l	BH	1	200.7	05/27/2003 01:48:00 AM
Potassium as K	3.7	mg/l	BH	1	200.7	05/27/2003 01:48:00 AM
Sodium as Na	370	mg/l	BH	1	200.7	05/27/2003 01:48:00 AM
Cations	16.37	meq/l	—	0.30	1030F	—
Anions	18.28	meq/l	—	0.38	1030F	—
Cation/Anion Balance	5.51	%	—	—	1030F	—
Methane (Headspace)	14.9	mg/l	CJ	1.0	3810/8015B	05/23/2003 10:54:00 AM
Date Reported	06/05/2003	—	—	—	—	—

Project Name: TONGUE RIVER MT  
 Project No.: AFE 3SAM1  
 Laboratory No.: 2003040156-12  
 Sample Name: 14M-3490 *Monarch*  
 Sample Date/Time: 04/15/2003 12:05:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	7.9	S.U.	DO	—	—	—
Electrical Conductivity (Field)	2160	umhos/cm	DO	—	—	—
Temperature (Field)	20.0	Degrees C	DO	—	—	—
pH	8.1	S.U.	HB	1.0-13.5	150.1	04/16/2003 05:05:00 PM
Electrical Conductivity	1950	umhos/cm	TB	10	2510B	04/18/2003 03:45:00 PM
Total Dissolved Solids	1220	mg/l	TB	20	160.1	04/17/2003 03:05:00 PM
Alkalinity Total as CaCO <sub>3</sub>	1210	mg/l	HB	1	2320B	04/17/2003 04:53:00 PM
Hardness as CaCO <sub>3</sub>	11	mg/l	BH	10	2340B	04/18/2003 04:59:00 PM
Sodium Absorption Ratio	71.6	units	BH	0.2	S-1.60	04/18/2003 04:59:00 PM
Alkalinity Bicarbonate as HCO <sub>3</sub>	1470	mg/l	HB	1	2320B	04/17/2003 04:53:00 PM
Alkalinity Carbonate as CO <sub>3</sub>	0	mg/l	HB	1	2320B	04/17/2003 04:53:00 PM
Alkalinity Hydroxide as OH	0	mg/l	HB	1	2320B	04/17/2003 04:53:00 PM
Chloride as Cl	22	mg/l	TB	5	325.3	04/29/2003 10:50:00 AM
Fluoride (undistilled)	2.87	mg/l	BB	0.1	4500-F-C	04/24/2003 02:27:00 PM
Nitrate + Nitrite as N	<0.01	mg/l	HB	0.01	353.2	04/22/2003 08:50:00 AM
Sulfate as SO <sub>4</sub>	<10	mg/l	CC	10	375.2	04/25/2003 01:56:59 PM
Ammonia (undistilled) as N	1.69	mg/l	CC	0.05	350.1	04/18/2003 10:21:00 AM
Acidity as CaCO <sub>3</sub>	20	mg/l	HB	5	305.2	04/18/2003 04:03:00 PM
Calcium as Ca	2.4	mg/l	BH	1	200.7	04/18/2003 04:59:48 PM
Magnesium as Mg	1.1	mg/l	BH	1	200.7	04/18/2003 04:59:48 PM
Potassium as K	5.4	mg/l	BH	1	200.7	04/18/2003 04:59:48 PM
Sodium as Na	534	mg/l	BH	1	200.7	04/18/2003 04:59:48 PM
Cations	23.90	meq/l	—	0.30	1030F	—
Anions	24.96	meq/l	—	0.38	1030F	—
Cation/Anion Balance	2.18	%	—	—	CALC	—
Methane (Headspace)	21.9	mg/l	CJ	1.0	3810/8015B	04/17/2003 11:12:00 AM
Methane (Zero Headspace)	NA	—	—	—	—	—

## FIDELITY EXPLORATION &amp; PRODUCTION CO.

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Project Name: TONGUE RIVER  
 Project No.: AFE 3SAM1  
 Laboratory No.: 2003050347-5  
 Sample Name: 14C-3589 *Carney*  
 Sample Date/Time: 05/27/2003 12:50:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	10.2	S.U.	DO			
Electrical Conductivity (Field)	3260	umhos/cm	DO			
Temperature (Field)	22.2	Degrees C	DO	—	—	—
pH	10.3	S.U.	CC	1.0-13.5	150.1	05/28/2003 06:10:00 PM
Electrical Conductivity	3180	umhos/cm	CC	10	2510B	06/06/2003 03:30:00 PM
Total Dissolved Solids	1700	mg/l	TB	20	160.1	05/30/2003 12:40:00 PM
Alkalinity Total as CaCO <sub>3</sub>	736	mg/l	CC	1	2320B	06/03/2003 04:26:00 PM
Hardness as CaCO <sub>3</sub>	<10	mg/l	—	10	2340B	—
Sodium Absorption Ratio	191	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	287	mg/l	CC	1	2320B	06/03/2003 04:26:00 PM
Alkalinity Carbonate as CO <sub>3</sub>	301	mg/l	CC	1	2320B	06/03/2003 04:26:00 PM
Alkalinity Hydroxide as OH	0	mg/l	CC	1	2320B	06/03/2003 04:26:00 PM
Chloride as Cl	453	mg/l	HB	5	325.3	06/04/2003 07:42:00 PM
Fluoride (undistilled)	2.48	mg/l	CC	0.1	4500-F-C	06/06/2003 09:23:00 AM
Nitrate + Nitrite as N	0.01	mg/l	CC	0.01	353.2	06/06/2003 04:30:00 PM
Sulfate as SO <sub>4</sub>	92	mg/l	CC	5	375.2	05/29/2003 05:48:00 PM
Ammonia (undistilled) as N	1.76	mg/l	CC	0.05	350.1	06/11/2003 05:46:00 PM
Acidity as CaCO <sub>3</sub>	<5	mg/l	CC	5	305.1	06/02/2003 02:28:00 PM
Calcium as Ca	0.6J	mg/l	BH	1	200.7	06/02/2003 05:05:00 PM
Magnesium as Mg	0.2J	mg/l	BH	1	200.7	06/02/2003 05:05:00 PM
Potassium as K	33	mg/l	BH	1	200.7	06/02/2003 05:05:00 PM
Sodium as Na	695	mg/l	BH	1	200.7	06/02/2003 05:05:00 PM
Cations	31.24	meq/l	—	0.30	1030F	—
Anions	29.55	meq/l	—	0.38	1030F	—
Cation/Anion Balance	2.79	%	—	—	1030F	—
Methane (Headspace)	6.6	mg/l	CJ	1.0	3810/8015B	06/02/2003 11:27:00 AM
Date Reported	06/17/2003					

## FIDELITY EXPLORATION &amp; PRODUCTION CO.

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Project Name: TONGUE RIVER - MT  
 Project No.: AFE 3SAM1  
 Laboratory No.: 2003060015-1  
 Sample Name: 32C-1980 *Carney*  
 Sample Date/Time: 06/02/2003 12:12:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	8.4	S.U.	DO			
Electrical Conductivity (Field)	2050	umhos/cm	DO			
Temperature (Field)	16.3	Degrees C	DO			
pH	8.6	S.U.	HB	1.0-13.5	150.1	06/03/2003 06:00:00 PM
Electrical Conductivity	2110	umhos/cm	TB	10	2510B	06/10/2003 10:40:00 AM
Total Dissolved Solids	1270	mg/l	TB	20	160.1	06/04/2003 11:15:00 AM
Alkalinity Total as CaCO <sub>3</sub>	705	mg/l	CC	1	2320B	06/12/2003 08:53:00 AM
Hardness as CaCO <sub>3</sub>	15	mg/l		10	2340B	—
Sodium Absorption Ratio	54.9	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	831	mg/l	CC	1	2320B	06/12/2003 08:53:00 AM
Alkalinity Carbonate as CO <sub>3</sub>	14	mg/l	CC	1	2320B	06/12/2003 08:53:00 AM
Alkalinity Hydroxide as OH	0	mg/l	CC	1	2320B	06/12/2003 08:53:00 AM
Chloride as Cl	66	mg/l	HB	5	325.3	06/13/2003 04:40:00 PM
Fluoride (undistilled)	2.95	mg/l	CC	0.1	4500-F-C	06/06/2003 02:37:00 PM
Nitrate + Nitrite as N	0.05	mg/l	CC	0.01	353.2	06/06/2003 04:48:00 PM
Sulfate as SO <sub>4</sub>	380	mg/l	CC	5	375.2	06/30/2003 03:41:00 PM
Ammonia (undistilled) as N	0.91	mg/l	CC	0.05	350.1	06/11/2003 06:02:00 PM
Acidity as CaCO <sub>3</sub>	<5	mg/l	CC	5	305.1	06/13/2003 08:24:00 AM
Calcium as Ca	4.0	mg/l	BH	1	200.7	06/04/2003 12:05:00 PM
Magnesium as Mg	1.3	mg/l	BH	1	200.7	06/04/2003 12:05:00 PM
Potassium as K	5.2	mg/l	BH	1	200.7	06/04/2003 12:05:00 PM
Sodium as Na	494	mg/l	BH	1	200.7	06/04/2003 12:05:00 PM
Cations	21.99	meq/l	—	0.30	1030F	—
Anions	24.02	meq/l		0.38	1030F	—
Cation/Anion Balance	4.42	%	—	—	1030F	—
Methane (Headspace)	<1.0	mg/l	CJ	1.0	3810/8015B	06/05/2003 08:35:00 AM
Date Reported						
	07/02/2003					

## FIDELITY EXPLORATION &amp; PRODUCTION CO.

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Project Name: TONGUE RIVER

Project No.: AFE 3SAM1

Laboratory No.: 2003050347-1

Sample Name: 41C-899 *Carney*

Sample Date/Time: 05/27/2003 10:20:

Collected by: DAVID OLSON

Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	8.7	S.U.	DO	—		
Electrical Conductivity (Field)	1180	umhos/cm	DO			
Temperature (Field)	21.0	Degrees C	DO	—		
pH	8.9	S.U.	CC	1.0-13.5	150.1	05/28/2003 06:10:00 PM
Electrical Conductivity	1180	umhos/cm	CC	10	2510B	06/06/2003 03:30:00 PM
Total Dissolved Solids	675	mg/l	TB	20	160.1	05/30/2003 12:40:00 PM
Alkalinity Total as CaCO <sub>3</sub>	611	mg/l	CC	1	2320B	06/03/2003 04:08:00 PM
Hardness as CaCO <sub>3</sub>	<10	mg/l		10	2340B	—
Sodium Absorption Ratio	49.2	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	688	mg/l	CC	1	2320B	06/03/2003 04:08:00 PM
Alkalinity Carbonate as CO <sub>3</sub>	28	mg/l	CC	1	2320B	06/03/2003 04:08:00 PM
Alkalinity Hydroxide as OH	0	mg/l	CC	1	2320B	06/03/2003 04:08:00 PM
Chloride as Cl	12	mg/l	HB	5	325.3	06/04/2003 07:32:00 PM
Fluoride (undistilled)	5.69	mg/l	CC	0.1	4500-F-C	06/06/2003 09:23:00 AM
Nitrate + Nitrite as N	0.02	mg/l	CC	0.01	353.2	06/06/2003 04:30:00 PM
Sulfate as SO <sub>4</sub>	16	mg/l	CC	5	375.2	05/29/2003 05:48:00 PM
Ammonia (undistilled) as N	0.83	mg/l	CC	0.05	350.1	06/11/2003 05:46:00 PM
Acidity as CaCO <sub>3</sub>	<5	mg/l	CC	5	305.1	06/02/2003 02:17:00 PM
Calcium as Ca	1.8	mg/l	BH	1	200.7	06/02/2003 04:46:00 PM
Magnesium as Mg	0.5J	mg/l	BH	1	200.7	06/02/2003 04:46:00 PM
Potassium as K	3.8	mg/l	BH	1	200.7	06/02/2003 04:46:00 PM
Sodium as Na	287	mg/l	BH	1	200.7	06/02/2003 04:46:00 PM
Cations	12.77	meq/l		0.30	1030F	—
Anions	13.19	meq/l		0.38	1030F	—
Cation/Anion Balance	1.64	%	—	—	1030F	—
Methane (Headspace)	23.9	mg/l	CJ	1.0	3810/8015B	06/02/2003 11:27:00 AM
Date Reported	06/17/2003	—	—	—	—	—

## FIDELITY EXPLORATION &amp; PRODUCTION CO.

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Name: TONGUE RIVER  
 Project No.: AFE 3SAM2  
 Laboratory No.: 2003050217-5  
 Sample Name: 23C-1499 *Carney*  
 Sample Date/Time: 05/16/2003 11:26:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	7.9	S.U.	DO			
Electrical Conductivity (Field)	1560	umhos/cm	DO			
Temperature (Field)	19.3	Degrees C	DO			
pH	8.3	S.U.	HB	1.0-13.5	150.1	05/20/2003 06:49:00 PM
Electrical Conductivity	1600	umhos/cm	TB	10	2510B	05/29/2003 09:10:00 AM
Total Dissolved Solids	894	mg/l	TB	20	160.1	05/23/2003 09:05:00 AM
Alkalinity Total as CaCO3	870	mg/l	CC	1	2320B	05/30/2003 10:34:00 AM
Hardness as CaCO3	<10	mg/l		10	2340B	—
Sodium Absorption Ratio	61.2	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO3	1060	mg/l	CC	1	2320B	05/30/2003 10:34:00 AM
Alkalinity Carbonate as CO3	0	mg/l	CC	1	2320B	05/30/2003 10:34:00 AM
Alkalinity Hydroxide as OH	0	mg/l	CC	1	2320B	05/30/2003 10:34:00 AM
Chloride as Cl	6	mg/l	HB	5	325.3	05/27/2003 06:23:00 PM
Fluoride (undistilled)	6.32	mg/l	CC	0.1	4500-F-C	05/30/2003 11:51:00 AM
Nitrate + Nitrite as N	0.01	mg/l	CC	0.01	353.2	06/02/2003 06:28:00 PM
Sulfate as SO4	9	mg/l	CC	5	375.2	05/28/2003 07:37:00 PM
Ammonia (undistilled) as N	0.49	mg/l	CC	0.05	350.1	05/23/2003 09:50:00 AM
Acidity as CaCO3	<5	mg/l	HB	5	305.2	05/29/2003 04:57:00 PM
Calcium as Ca	2.2	mg/l	BH	1	200.7	05/27/2003 01:50:00 AM
Magnesium as Mg	0.7J	mg/l	BH	1	200.7	05/27/2003 01:50:00 AM
Potassium as K	4.3	mg/l	BH	1	200.7	05/27/2003 01:50:00 AM
Sodium as Na	403	mg/l	BH	1	200.7	05/27/2003 01:50:00 AM
Cations	17.83	meq/l		0.30	1030F	—
Anions	17.92	meq/l	—	0.38	1030F	—
Cation/Anion Balance	0.24	%	—	—	1030F	—
Methane (Headspace)	16.0	mg/l	CJ	1.0	3810/8015B	05/23/2003 10:54:00 AM
Date Reported	06/05/2003					

## FIDELITY EXPLORATION &amp; PRODUCTION CO.

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Name: TONGUE RIVER  
 Project No.: AFE 3SAM2  
 Laboratory No.: 2003050217-7  
 Sample Name: 32C-1499 *Carney*  
 Sample Date/Time: 05/16/2003 11:56:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	8.0	S.U.	DO	—	—	—
Electrical Conductivity (Field)	1540	umhos/cm	DO	—	—	—
Temperature (Field)	19.6	Degrees C	DO	—	—	—
pH	8.3	S.U.	HB	1.0-13.5	150.1	05/20/2003 06:53:00 PM
Electrical Conductivity	1450	umhos/cm	TB	10	2510B	05/29/2003 09:10:00 AM
Total Dissolved Solids	876	mg/l	TB	20	160.1	05/23/2003 09:05:00 AM
Alkalinity Total as CaCO <sub>3</sub>	917	mg/l	CC	1	2320B	05/30/2003 10:40:00 AM
Hardness as CaCO <sub>3</sub>	<10	mg/l	—	10	2340B	—
Sodium Absorption Ratio	57.6	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	1120	mg/l	CC	1	2320B	05/30/2003 10:40:00 AM
Alkalinity Carbonate as CO <sub>3</sub>	0	mg/l	CC	1	2320B	05/30/2003 10:40:00 AM
Alkalinity Hydroxide as OH	0	mg/l	CC	1	2320B	05/30/2003 10:40:00 AM
Chloride as Cl	6	mg/l	HB	5	325.3	05/27/2003 06:27:00 PM
Fluoride (undistilled)	4.92	mg/l	CC	0.1	4500-F-C	05/30/2003 11:51:00 AM
Nitrate + Nitrite as N	0.01	mg/l	CC	0.01	353.2	06/02/2003 06:28:00 PM
Sulfate as SO <sub>4</sub>	13	mg/l	CC	5	375.2	05/28/2003 07:37:00 PM
Ammonia (undistilled) as N	0.50	mg/l	CC	0.05	350.1	05/23/2003 09:50:00 AM
Acidity as CaCO <sub>3</sub>	<5	mg/l	HB	5	305.2	05/29/2003 04:57:00 PM
Calcium as Ca	2.7	mg/l	BH	1	200.7	05/27/2003 01:55:00 AM
Magnesium as Mg	0.5J	mg/l	BH	1	200.7	05/27/2003 01:55:00 AM
Potassium as K	4.0	mg/l	BH	1	200.7	05/27/2003 01:55:00 AM
Sodium as Na	392	mg/l	BH	1	200.7	05/27/2003 01:55:00 AM
Cations	17.38	meq/l		0.30	1030F	—
Anions	18.99	meq/l	—	0.38	1030F	—
Cation/Anion Balance	4.42	%	—	—	1030F	—
Methane (Headspace)	15.5	mg/l	CJ	1.0	3810/8015	05/23/2003 10:54:00 AM
Date Reported	06/05/2003					

## FIDELITY EXPLORATION &amp; PRODUCTION CO.

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Project Name: TONGUE RIVER  
 Project No.: AFE 3SAM1  
 Laboratory No.: 2003060131-1  
 Sample Name: 14C-3299 *Carmey*  
 Sample Date/Time: 06/09/2003 07:30:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	8.1	S.U.	DO			
Electrical Conductivity (Field)	2970	umhos/cm	DO			
Temperature (Field)	14.7	Degrees C	DO			
pH	8.4	S.U.	CC	1.0-13.5	150.1	06/12/2003 06:55:00 PM
Electrical Conductivity	2660	umhos/cm	TB	10	2510B	06/19/2003 09:05:00 AM
Total Dissolved Solids	1830	mg/l	CC	20	160.1	06/16/2003 04:15:00 PM
Alkalinity Total as CaCO <sub>3</sub>	1160	mg/l	AH	1	2320B	06/19/2003 09:09:00 AM
Hardness as CaCO <sub>3</sub>	18	mg/l		10	2340B	----
Sodium Absorption Ratio	78.1	units	--	0.2	S-1.60	----
Alkalinity Bicarbonate as HCO <sub>3</sub>	1390	mg/l	AH	1	2320B	06/19/2003 09:09:00 AM
Alkalinity Carbonate as CO <sub>3</sub>	14	mg/l	AH	1	2320B	06/19/2003 09:09:00 AM
Alkalinity Hydroxide as OH	0	mg/l	AH	1	2320B	06/19/2003 09:09:00 AM
Chloride as Cl	20	mg/l	HB	5	325.3	06/16/2003 06:05:00 PM
Fluoride (undistilled)	2.28	mg/l	HB	0.1	4500-F-C	06/25/2003 04:08:00 PM
Nitrate + Nitrite as N	0.02	mg/l	CC	0.01	353.2	07/02/2003 01:01:00 PM
Sulfate as SO <sub>4</sub>	428	mg/l	CC	5	375.2	06/18/2003 09:26:00 AM
Ammonia (undistilled) as N	2.01	mg/l	CC	0.05	350.1	06/23/2003 04:18:00 PM
Acidity as CaCO <sub>3</sub>	<5	mg/l	AH	5	305.1	06/13/2003 10:04:00 AM
Calcium as Ca	4.2	mg/l	BH	1	200.7	06/20/2003 03:44:00 PM
Magnesium as Mg	1.8	mg/l	BH	1	200.7	06/20/2003 03:44:00 PM
Potassium as K	6.6	mg/l	BH	1	200.7	06/20/2003 03:44:00 PM
Sodium as Na	759	mg/l	BH	1	200.7	06/20/2003 03:47:00 PM
Cations	33.68	meq/l		0.30	1030F	----
Anions	32.79	meq/l		0.38	1030F	----
Cation/Anion Balance	1.35	%	--	--	1030F	----
Methane (Headspace)	<1.0	mg/l	CJ	1.0	3810/8015B	06/18/2003 10:46:00 AM
Date Reported	07/02/2003	---				

Project Name: TONGUE RIVER MT

Project No.: AFE 3SAM1

Laboratory No.: 2003040173-9

Sample Name: 33C-3499 *Carney*

Sample Date: 04/16/2003

Collected by: DAVID OLSON

Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	7.9	S.U.	DO			
Electrical Conductivity (Field)	2070	umhos/cm	DO			
Temperature (Field)	15.2	Degrees C	DO			
pH	8.0	S.U.	HB	1.0-13.5	150.1	04/18/2003 04:42:00 PM
Electrical Conductivity	1870	umhos/cm	TB	10	2510B	04/18/2003 03:45:00 PM
Total Dissolved Solids	1250	mg/l	TB	20	160.1	04/19/2003 10:30:00 AM
Alkalinity Total as CaCO <sub>3</sub>	1160	mg/l	HB	1	2320B	04/25/2003 11:03:00 AM
Hardness as CaCO <sub>3</sub>	15	mg/l		10	2340B	—
Sodium Absorption Ratio	59.8	units	—	—	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	1410	mg/l	CC	1	2320B	04/25/2003 11:07:00 AM
Alkalinity Carbonate as CO <sub>3</sub>	0	mg/l	HB	1	2320B	04/25/2003 11:07:00 AM
Alkalinity Hydroxide as OH	0	mg/l	HB	1	2320B	04/25/2003 11:07:00 AM
Chloride as Cl	24	mg/l	TB	5	325.3	04/29/2003 10:50:00 AM
Fluoride (undistilled)	3.69	mg/l	BB	0.1	4500-F-C	04/24/2003 02:27:00 PM
Nitrate + Nitrite as N	<0.01	mg/l	HB	0.01	353.2	04/22/2003 09:20:00 AM
Sulfate as SO <sub>4</sub>	12	mg/l	CC	10	375.2	04/25/2003 02:08:00 PM
Ammonia (undistilled) as N	1.56	mg/l	CC	0.05	351.2	04/30/2003 04:40:00 PM
Acidity as CaCO <sub>3</sub>	<5	mg/l	HB	5	305.2	04/28/2003 03:04:00 PM
Calcium as Ca	3.4	mg/l	BH	1	200.7	04/23/2003 01:49:24 PM
Magnesium as Mg	1.5	mg/l	BH	1	200.7	04/23/2003 01:49:24 PM
Potassium as K	5.9	mg/l	BH	1	200.7	04/23/2003 01:49:24 PM
Sodium as Na	527	mg/l	BH	1	200.7	04/23/2003 01:49:24 PM
Cations	23.48	meq/l		0.30	1030F	
Anions	23.93	meq/l		0.38	1030F	—
Cation/Anion Balance	0.96	%	—	—	1030F	
Methane (Headspace)	17.4	mg/l	CJ	1.0	3810/8015B	04/24/2003 07:44:00 AM
Methane (Zero Headspace)	9.5	mg/l	CJ	1.0	3810/8015B	04/24/2003 07:44:00 AM

## FIDELITY EXPLORATION &amp; PRODUCTION CO.

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Project Name: TONGUE RIVER - MT  
 Project No.: AFE 3SAM2  
 Laboratory No.: 2003050159-14  
 Sample Name: 32C-1990 *Cavney*  
 Sample Date/Time: 05/13/2003 14:50:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	8.0	S.U.	DO	—	—	—
Electrical Conductivity (Field)	1570	umhos/cm	DO	—	—	—
Temperature (Field)	20.8	Degrees C	DO	—	—	—
pH	8.3	S.U.	HHB	1.0-13.5	150.1	05/15/2003 06:11:00 PM
Electrical Conductivity	1480	umhos/cm	TB	10	2510B	05/29/2003 09:10:00 AM
Total Dissolved Solids	900	mg/l	TB	20	160.1	05/16/2003 11:30:00 AM
Alkalinity Total as CaCO <sub>3</sub>	928	mg/l	CC	1	2320B	05/23/2003 01:40:00 PM
Hardness as CaCO <sub>3</sub>	<10	mg/l		10	2340B	—
Sodium Absorption Ratio	67.8	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	1100	mg/l	CC	1	2320B	05/23/2003 01:40:00 PM
Alkalinity Carbonate as CO <sub>3</sub>	14	mg/l	CC	1	2320B	05/23/2003 01:40:00 PM
Alkalinity Hydroxide as OH	0	mg/l	CC	1	2320B	05/23/2003 01:40:00 PM
Chloride as Cl	8	mg/l	HB	5	325.3	05/27/2003 05:03:00 PM
Fluoride (undistilled)	6.50	mg/l	HB	0.1	4500-F-C	05/28/2003 05:02:00 PM
Nitrate + Nitrite as N	0.01	mg/l	CC	0.01	353.2	06/02/2003 12:58:00 PM
Sulfate as SO <sub>4</sub>	7	mg/l	CC	5	375.2	05/28/2003 05:46:00 PM
Ammonia (undistilled) as N	0.63	mg/l	CC	0.05	350.1	05/20/2003 12:50:00 PM
Acidity as CaCO <sub>3</sub>	<5	mg/l	HB	5	305.2	05/20/2003 04:27:00 PM
Calcium as Ca	1.6	mg/l	BH	1	200.7	05/16/2003 12:56:36 PM
Magnesium as Mg	0.8 J	mg/l	BH	1	200.7	05/16/2003 12:56:36 PM
Potassium as K	4.6	mg/l	BH	1	200.7	05/16/2003 12:56:36 PM
Sodium as Na	418	mg/l	BH	1	200.7	05/16/2003 12:56:36 PM
Cations	18.49	meq/l		0.30	1030F	—
Anions	19.27	meq/l	—	0.38	1030F	—
Cation/Anion Balance	2.07	%	—	—	1030F	—
Methane (Headspace)	22.2	mg/l	CJ	1.0	3810/8015B	05/23/2003 08:12:00 AM
Date Reported	06/03/2003	—	—	—	—	—

Location: TONGUE RIVER-MT  
 Lab No.: AFE 3SAM2  
 Laboratory No.: 2003050277-2  
 Sample Name: 23C-3390 *Carney*  
 Sample Date/Time: 05/21/2003 13:15:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	7.9	S.U.	DO			
Electrical Conductivity (Field)	2020	umhos/cm	DO			
Temperature (Field)	22.3	Degrees C	DO			
pH	8.2	S.U.	TB	1.0-13.5	150.1	05/23/2003 12:00:00 AM
Electrical Conductivity	1960	umhos/cm	TB	10	2510B	06/05/2003 11:15:00 AM
Total Dissolved Solids	1190	mg/l	CC	20	160.1	05/27/2003 07:40:00 PM
Alkalinity Total as CaCO <sub>3</sub>	1050	mg/l	CC	1	2320B	06/02/2003 04:57:00 PM
Hardness as CaCO <sub>3</sub>	19	mg/l	—	10	2340B	—
Sodium Absorption Ratio	51.2	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	1280	mg/l	CC	1	2320B	06/02/2003 04:57:00 PM
Alkalinity Carbonate as CO <sub>3</sub>	0	mg/l	CC	1	2320B	06/02/2003 04:57:00 PM
Alkalinity Hydroxide as OH	0	mg/l	CC	1	2320B	06/02/2003 04:57:00 PM
Chloride as Cl	24	mg/l	HB	5	325.3	06/04/2003 05:40:00 PM
Fluoride (undistilled)	3.15	mg/l	HB	0.1	4500-F-C	06/05/2003 01:20:00 PM
Nitrate + Nitrite as N	0.02	mg/l	CC	0.01	353.2	06/06/2003 04:00:00 PM
Sulfate as SO <sub>4</sub>	11	mg/l	CC	5	375.2	05/29/2003 03:02:00 PM
Ammonia (undistilled) as N	0.49	mg/l	CC	0.05	350.1	06/12/2003 04:58:00 PM
Acidity as CaCO <sub>3</sub>	<5	mg/l	HB	5	305.2	05/29/2003 05:09:00 PM
Calcium as Ca	5.4	mg/l	BH	1	200.7	05/27/2003 05:11:00 AM
Magnesium as Mg	1.4	mg/l	BH	1	200.7	05/27/2003 05:11:00 AM
Potassium as K	5.3	mg/l	BH	1	200.7	05/27/2003 05:11:00 AM
Sodium as Na	515	mg/l	BH	1	200.7	05/27/2003 05:11:00 AM
Cations	22.95	meq/l	—	0.30	1030F	—
Anions	22.07	meq/l	—	0.38	1030F	—
Cation/Anion Balance	1.96	%	—	—	1030F	—
Methane (Headspace)	36.4	mg/l	CJ	1.0	3810/8015B	05/27/2003 10:23:00 AM
Date Reported	06/16/2003	—	—			

Site: TONGUE RIVER-MT  
 Project No.: AFE 3SAM2  
 Laboratory No.: 2003050277-3  
 Sample Name: 33C-3390 *Canyon*  
 Sample Date/Time: 05/21/2003 13:28:  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	8.1	S.U.	DO	—		
Electrical Conductivity (Field)	2080	umhos/cm	DO			
Temperature (Field)	23.7	Degrees C	DO	—	—	—
pH	8.3	S.U.	TB	1.0-13.5	150.1	05/23/2003 12:00:00 AM
Electrical Conductivity	2120	umhos/cm	TB	10	2510B	06/05/2003 11:15:00 AM
Total Dissolved Solids	1220	mg/l	CC	20	160.1	05/27/2003 07:40:00 PM
Alkalinity Total as CaCO <sub>3</sub>	1140	mg/l	CC	1	2320B	06/02/2003 04:59:00 PM
Hardness as CaCO <sub>3</sub>	12	mg/l		10	2340B	—
Sodium Absorption Ratio	65.0	units	—	0.2	S-1.60	—
Alkalinity Bicarbonate as HCO <sub>3</sub>	1390	mg/l	CC	1	2320B	06/02/2003 04:59:00 PM
Alkalinity Carbonate as CO <sub>3</sub>	0	mg/l	CC	1	2320B	06/02/2003 04:59:00 PM
Alkalinity Hydroxide as OH	0	mg/l	CC	1	2320B	06/02/2003 04:59:00 PM
Chloride as Cl	24	mg/l	HB	5	325.3	06/04/2003 05:42:00 PM
Fluoride (undistilled)	3.63	mg/l	HB	0.1	4500-F-C	06/05/2003 01:20:00 PM
Nitrate + Nitrite as N	0.02	mg/l	CC	0.01	353.2	06/06/2003 04:00:00 PM
Sulfate as SO <sub>4</sub>	12	mg/l	CC	5	375.2	05/29/2003 03:02:00 PM
Ammonia (undistilled) as N	1.51	mg/l	CC	0.05	350.1	06/11/2003 04:23:00 PM
Acidity as CaCO <sub>3</sub>	<5	mg/l	HB	5	305.2	05/29/2003 05:10:00 PM
Calcium as Ca	3.4	mg/l	BH	1	200.7	05/27/2003 05:13:00 AM
Magnesium as Mg	0.9J	mg/l	BH	1	200.7	05/27/2003 05:13:00 AM
Potassium as K	5.4	mg/l	BH	1	200.7	05/27/2003 05:13:00 AM
Sodium as Na	523	mg/l	BH	1	200.7	05/27/2003 05:13:00 AM
Cations	23.24	meq/l		0.30	1030F	—
Anions	23.92	meq/l		0.38	1030F	—
Cation/Anion Balance	1.44	%	—	—	1030F	—
Methane (Headspace)	28.2	mg/l	CJ	1.0	3810/8015B	05/27/2003 10:23:00 AM
Date Reported	06/16/2003					

Name: TONGUE RIVER MT  
 Project No.: AFE 3SAM1  
 Laboratory No.: 2003040156-11  
 Sample Name: 14C-3490 *Carney*  
 Sample Date: 04/15/2003  
 Collected by: DAVID OLSON  
 Sample Type: WATER

PARAMETER	MEASURED VALUE	UNITS	ANALYST	PQL	METHOD NUMBER	DATE/TIME ANALYZED
pH (Field)	7.9	S.U.	DO			
Electrical Conductivity (Field)	2130	umhos/cm	DO			
Temperature (Field)	22.5	Degrees C	DO			
pH	8.2	S.U.	HB	1.0-13.5	150.1	04/16/2003 05:02:00 PM
Electrical Conductivity	1940	umhos/cm	TB	10	2510B	04/18/2003 03:45:00 PM
Total Dissolved Solids	1170	mg/l	TB	20	160.1	04/17/2003 03:05:00 PM
Alkalinity Total as CaCO <sub>3</sub>	1160	mg/l	HB	1	2320B	04/17/2003 04:53:00 PM
Hardness as CaCO <sub>3</sub>	12	mg/l	BH	10	2340B	04/18/2003 04:55:00 PM
Sodium Absorption Ratio	68.7	units	BH	0.2	S-1.60	04/18/2003 04:55:00 PM
Alkalinity Bicarbonate as HCO <sub>3</sub>	1420	mg/l	HB	1	2320B	04/17/2003 04:53:00 PM
Alkalinity Carbonate as CO <sub>3</sub>	0	mg/l	HB	1	2320B	04/17/2003 04:53:00 PM
Alkalinity Hydroxide as OH	0	mg/l	HB	1	2320B	04/17/2003 04:53:00 PM
Chloride as Cl	24	mg/l	TB	5	325.3	04/29/2003 10:50:00 AM
Fluoride (undistilled)	2.68	mg/l	BB	0.1	4500-F-C	04/24/2003 02:27:00 PM
Nitrate + Nitrite as N	<0.01	mg/l	HB	0.01	353.2	04/22/2003 08:50:00 AM
Sulfate as SO <sub>4</sub>	<10	mg/l	CC	10	375.2	04/25/2003 01:55:11 PM
Ammonia (undistilled) as N	1.48	mg/l	CC	0.05	350.1	04/18/2003 10:21:00 AM
Acidity as CaCO <sub>3</sub>	<5	mg/l	HB	5	305.2	04/18/2003 04:00:00 PM
Calcium as Ca	3	mg/l	BH	1	200.7	04/18/2003 04:55:16 PM
Magnesium as Mg	1	mg/l	BH	1	200.7	04/18/2003 04:55:16 PM
Potassium as K	6	mg/l	BH	1	200.7	04/18/2003 04:55:16 PM
Sodium as Na	538	mg/l	BH	1	200.7	04/18/2003 04:55:16 PM
Cations	23.89	meq/l		0.30	1030F	—
Anions	24.01	meq/l		0.38	1030F	—
Cation/Anion Balance	0.25	%	—		CALC	—
Methane (Headspace)	15.4	mg/l	CJ	1.0	3810/8015B	04/17/2003 11:12:00 AM
Methane (Zero Headspace)	NA					